



NIGERIA

Annual Report on the Agricultural Department for the year 1947

*Laid on the Table of the Legislative Council
as Sessional Paper No. 12 of 1949*

PRICE 9d NET

*Printed and published by the Government Printer, Lagos, 1949
To be purchased from the C.M.S. Bookshops, Lagos and
Port Harcourt, the S.I.M. Bookshop, Jos, and
the Crown Agents for the Colonies
4, Millbank, London, S.W.1*

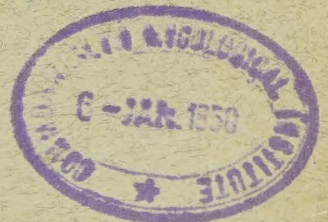


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FOREWORD

During the year 1947 the advantages to be gained from Regionalisation became increasingly apparent with the gradual delegation of responsibilities to Regional Deputy Directors.

It is worthy of note that despite continued staff shortages a remarkable volume of work was carried out by the Research sections and field staff in all Regions. It has not been possible to proceed with the Development plan as rapidly as had been hoped, but projects which were commenced have been developed with energy.

I wish particularly to pay tribute to the staff of the Cocoa Survey in the Western Provinces for the progress made in the work of examining more than a quarter of a million cocoa farms since the survey began in 1944, and for the valuable information derived therefrom.

The Regional Deputy Director in the Western Provinces draws attention to the improvement in quality of cocoa which resulted from a combined effort to raise the standard of fermentation and to reduce careless handling. This good work coupled with improvements in the Produce Inspection service and a higher price for cocoa resulted in the marketing of a product of high quality, which has brought enthusiastic tribute from large-scale manufacturers and dealers.

The Oil Palm Research Station is situated near Benin in the Western Provinces, and a detailed record of the research activities of the station is issued annually as a separate report. A summary of these activities is included here in the report of the Specialist Sections of the Department. The work of the station is made possible by means of a grant from Colonial Development funds.

During the year three members of the Junior staff of the Department were sent to the United Kingdom for studies, thus bringing to six the total number receiving the benefit of scholarships at the end of the year. A start was made on the construction of permanent buildings at the Agricultural School at Samaru, Zaria.

A draft Agriculture Bill designed to bring together all existing legislation and introducing a few new measures, was subjected to a good deal of public criticism. In consideration of representations by the Houses of Assembly the bill was redrafted with a view to submission for further consideration in 1948.

A. G. BEATTIE,
Director of Agriculture



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I. Northern Provinces

GENERAL

In the opening paragraphs of my report for 1946 attention was called to the formidable programme of proposed agricultural development and the very inadequate staff then available for carrying it out. It is unfortunate that there has been little, if any, improvement in the staff situation during the year 1947 now under review. Mr I. E. James, Deputy Director of Agriculture, left on retirement, Mr Sabiston was sent home on medical grounds after acting as Assistant Director for only three months, two Agricultural Officers were transferred to the Western Region, one resigned and another was permanently invalided. Against these losses a Secretary and two Agricultural Development Officers were appointed and a Chemist, with previous experience in Nigeria, returned on transfer from the Gold Coast. Of the total establishment of forty-seven Senior Service Officers in the Northern Regional Estimates only twenty-seven places are filled and there is a corresponding shortage of research officers for whom provision is made in Central Estimates. In the absence of Senior Officers it has been necessary to leave certain of our stations in the care of members of the Junior Staff with little or no supervision. Every opportunity has been given to Assistant Agricultural Officers to demonstrate their ability and to take a greater share of responsibilities.

The Agricultural Engineer and Agricultural Officers were again required to devote time to the construction of houses and other buildings, principally at Yola, Maiduguri, Samaru, Yandev and Ilorin. Minor building programmes, including the provision of more and better quarters for junior staff, have been carried out at most of our stations. Work on the new Agricultural School building at Samaru was started by the Public Works Department towards the end of the year. Meanwhile the annual intake of new Assistants for training is being increased from twenty to thirty by the use of additional temporary buildings.

Although some interesting and valuable results have been achieved at Shika Stock Farm and in the new herd at Maiduguri, our work with cattle has been hampered by disease, notably Contagious Abortion. This disease, though present in our herds as shown by blood tests, has in itself shown little evidence of material damage but restrictions imposed on the movement of stock to and from infected herds have allowed little scope for development, and have brought about the temporary closing down of the dairy schemes operated between Samaru, Lagos and Ibadan. The results of the Veterinary Department's investigations into this disease are eagerly awaited.

With a continued shortage of consumer goods and high prices received for groundnuts for export there has been a heavy demand for local foodstuffs and cotton for local manufacture and their prices remained high.

THE SEASON 1947

2. Of the more northerly provinces Bornu received an average precipitation, but elsewhere a shortage of rain was reported with particularly bad distribution in Sokoto. In Bauchi and Zaria the rains, though a little late in starting, were sufficient for the production of satisfactory crops. In the middle belt rainfall was heavier than usual ; in the rice growing areas there were some losses due to excessive flooding in Niger/Ilorin but on the whole the rice crops there were good. Sokoto suffered losses through water shortage. Nowhere in the producing areas of the Northern Provinces was there any serious food shortage though supplies have not always been readily obtainable in the towns and prices have been high ; this state of affairs is attributable not to any genuine scarcity but to reluctance on the part of growers to sell their grain while the opportunity for obtaining imported consumer goods remains so small.

Typical rainfall records are quoted below :—

NORTH

Months	BAUCHI		KAFINSOLI		SAMARU	
	Average (11 yrs.) <i>ins.</i>	1947 <i>ins.</i>	Average (16 yrs.) <i>ins.</i>	1947 <i>ins.</i>	Average (10 yrs.) <i>ins.</i>	1947 <i>ins.</i>
January	—	—	—	—	—	—
February	—	—	—	—	0.61	—
March	0.08	—	—	—	0.24	—
April	1.73	0.31	0.23	0.24	1.16	0.01
May	3.38	3.47	2.66	0.98	4.99	5.50
June	5.90	5.68	3.87	3.67	5.08	8.45
July	10.22	7.92	8.02	8.15	7.67	10.15
August	15.41	13.79	11.29	6.68	12.53	11.70
September	7.75	6.65	6.08	3.88	7.42	8.48
October	2.02	2.60	0.49	0.01	1.57	1.16
November	0.16	0.36	—	—	—	—
December	0.01	—	—	—	—	—
Total	46.66	40.78	32.64	23.61	40.72	45.45

MIDDLE BELT

Months	ILORIN		YANDEV		BIDA	
	Average (43 yrs.) <i>ins.</i>	1947 <i>ins.</i>	Average (20 yrs.) <i>ins.</i>	1947 <i>ins.</i>	Average (10 yrs.) <i>ins.</i>	1947 <i>ins.</i>
January	0.22	—	0.35	—	—	—
February	0.71	0.38	0.77	1.63	0.41	—
March	2.12	0.73	1.45	1.13	1.47	—
April	4.09	4.07	4.00	4.30	2.32	0.81
May	6.60	4.60	6.99	6.71	5.32	9.12
June	7.67	10.39	7.65	9.89	7.58	7.42
July	5.38	3.85	5.12	5.17	7.18	11.43
August	4.92	14.11	6.55	9.73	8.98	8.91
September	9.56	11.27	11.15	11.56	9.34	16.22
October	6.92	5.34	9.20	5.87	4.29	3.36
November	1.24	0.40	0.51	0.61	0.46	—
December	0.29	—	0.18	—	0.01	—
Total	49.72	55.14	53.92	56.60	47.36	57.27

ANIMAL HUSBANDRY

3. *Shika Stock Farm.*—A new lactation record of 6,935 lb in 356 days was set up this year by Jot Koram Cow No. 22 ; this was one of six cows acquired from Maiduguri in 1944. The previous record at Shika made in 1936 by Sokoto Cow No. 31 was 5,805 lb of milk in 322 days ; the increase is therefore 1,130 lb. Apart from this the year has been a normal one at Shika. The Sokoto herd is showing considerable promise, largely due to the good yields which the daughters of Stock Bull No. 17 are maintaining. The White Fulani herd on the other hand has only just held its own and it seems essential that some good (proven) new blood should be introduced into the herd from outside as soon as it is possible to do so.

A system of controlled mating was introduced towards the end of the year. Under the previous system, where one of the bulls ran constantly with a herd of 50 to 60 cows, in-breeding was inevitably beginning to take place. Now under the new system every cow is mated to the most suitable bull according to her pedigree. All cows' pedigrees have been examined individually and separated into different proven strains ; 25 per cent of strains two and four are being purposely in-bred whilst the other 75 per cent are being out-crossed. It is commonly held that in the tropics cows are liable to menstruate for very short periods only and that it frequently occurs at night. Under such circumstances where controlled mating is practised a considerable number of services are inevitably missed, but so far after several months experience at Shika this does not appear to be a serious problem and the number of services appear to be very nearly normal. Apart from the presence of Contagious Abortion the position as regards health was satisfactory. Severe restrictions on movement of stock were imposed in connection with Contagious Abortion but in spite of the high proportion of positive reactors (over 50 per cent of the herd) the number of actual abortions continued to be small ; out of 264 calvings during the year there were only twelve abortions and of these five were from cows giving a negative reaction to the agglutination test.

4. *Ilorin Stock Farm.*—The Department, in conjunction with the Veterinary Department, has continued on former lines the work on breeding cattle suitable for Middle Belt and Southern conditions. The year's work has largely confirmed the superiority of the N'Dama breed of cattle over other types as regards tolerance to trypanosomiasis and general survival. It has therefore been decided to concentrate on breeding N'Damas. Breeding of pure bred W.A. Shorthorn types will be discontinued and this breed will be graded up to the N'Dama. Further research, however, is necessary particularly to provide information regarding the extent to which resistance to trypanosomiasis is hereditary or acquired, and in order to carry out this work fly-proof byres are now being built.

Owing to adverse circumstances at Ilorin during 1947 the general health of the stock has suffered. Animals isolated from the stock farm, on account of contagious abortion broke down in condition during the middle of the year and very severe losses resulted, particularly during the period August to October. Heartwater, coupled with protozoic infection, caused many deaths and the very severe weather conditions which prevailed in August to September caused the

animals to lose condition rapidly. 139 animals were lost of which 71 per cent were in the isolated herd. Of these 45 per cent were calves under one year old. Again the N'Damas withstood the unfavourable conditions and fortunately the losses were not heavy in this breed.

Owing to restrictions imposed in connection with contagious abortion no distribution of animals has taken place; but limited distribution, after the results of further agglutination tests are known, should be possible early in 1948.

5. *Mixed Farming*.—At the end of September the total number of practising mixed farmers in the Northern Provinces was 4,068, being a net increase of 741 over 1946; this rate of increase was roughly the same as in the previous year. The greatest increase was in Kano Province where 269 new farmers were set up. The rate of expansion over five years periods is shewn in the table below:—

Year	<i>Active Mixed Farmers at end of year</i>					
1932	.	..	..	..	..	108
1937	..	..	..	.	..	1,433
1942	..	..	..	..	..	1,962
1947	..	..	..	..	..	4,068

The main obstacles to greater progress are (a) high prices of cattle and difficulty in obtaining adequate numbers, (b) difficulty in importing enough ploughs to satisfy demands. The number of farmers who purchase their own cattle replacements is small and the great majority depend upon Native Administration pools. In Kano out of 934 cattle purchased under the auspices of the Department 400 were issued as replacements and 534 to new farmers. Taking advantage of the present high prices many mixed farmers are fattening their cattle and turning them over to the butchers, thus increasing the demands on the cattle pools for replacement with store beasts.

6. *Cattle Auction Sales, Kano*.—These continue to be a success and have been extended to include cattle from Kafinsoli, Daura, and to a smaller extent from Azare. 581 beasts were auctioned for £6,890 in 1947 compared with 416 for £3,802 in 1946. This shows an average increase of £2 13s 6d per head over the previous year, due to better quality coupled with generally increased prices. The following shows that the price has increased in all grades of beasts sold at the auction.

Grade	<i>No. of Cattle</i>		<i>Average Prices</i>	
	1946	1947	1946	1947
			<i>per lb</i>	<i>per lb</i>
V. Fat ..	6	18	3.30d	4.28d
Fat	133	205	3.04d	3.77d
Forward Stores ..	164	267	2.86d	3.45d
Stores	42	46	2.17d	3.21d

7. *Dairying*—(a) *Kano*.—This scheme was started in 1944 with the object of increasing the amount of manure available to farmers in the closely farmed areas and the supply of milk and milk-products to Kano City. Progress has been slow. Not only have we been faced with the difficulty of obtaining the right type of cow but also with teaching the farmer to manage the cows. Irregular breeding of the average Fulani cow under bush conditions is another serious problem; also insecurity of tenure with the expansion of Kano has been a contributing factor as the land of many farmers in the area is liable to expropriation for building. A further difficulty this year was the shortage of rain, making grazing even scarcer than usual. As a result not only did the proportion of cows in milk fall, but also the actual production of milk decreased. Preliminary investigations indicate that irregularity of breeding is the main cause of the trouble, and a very considerable increase may be expected next year. A detailed survey of the position is being made. Of the twenty-four cows which calved in the pool only ten were suitable for issue, the remainder being retained to rear their calves and for further test. The possibility of importing baled hay for these farmers from the districts, *e.g.*, Dan Gora, etc., is being investigated. On 31st December, 1947, there were ninety-three cows and heifers in the pool. The small Native Administration Dairy run in conjunction with the Dairy Cow Scheme was again operated, but was taken over by Government in November. The new Government Dairy building was nearing completion at the end of the year and equipment is now arriving. Fresh milk from the Dairy Cow Scheme was retailed under the Native Administration to simplify accounting. The supply of fresh pasteurised skim milk from the Veterinary Department creameries came to an end, as that Department did not operate in the Province this year. During the first few years of the war it was possible to buy large quantities of surplus milk from the Fulani in Kano Province at 4d per gallon. This was a poverty surplus created by the inability of the local population to buy milk. Now, with the high prices of produce and scarcity of consumer goods, competition with local demand is high and at the moment (late February) great difficulty is being experienced in obtaining ten gallons per day at Dabi at 1s 3d per gallon. It will not be possible to assess the true position until the result of one dry season's working at Birniwa is known. Soured pasteurised skim milk has been sold to the new Girls' Training Centre, Middle School and local markets. During the rains butter production was increased in view of heavy pressure from local residents who hold the Kano Dairy butter in very high esteem. During the year 35,500 bottles of fresh milk, 5,700 gallons of skim milk, 1,490 lb cream, 2,624 lb butter and 338 lb cream cheese were sold giving a turnover of £1,343. Demand was fairly well satisfied during the rains but in the dry season production fell far below the demand.

(b) *Kabba Province*.—The two Native Administration dairies at Okene and Kabba were operated with success under the auspices of the Department. Okene purchased 31,685 lb milk from village kraals and produced 1,910 lb of butter. Kabba dairy bought 7,587 lb of milk and produced 529 lb cream. Corresponding figures for 1946 were 26,557 lb milk and 1,650 lb butter at Okene and 5,859 lb milk and 350 lb cream at Kabba.

8. *Pigs*.—As mentioned in the 1946 Annual Report of the Department for the Northern Provinces there has been a revival in the demand for bacon pigs. To meet this the Department has undertaken an increased breeding programme at all its piggeries and Daudawa piggery has recently been re-opened. Encouragement continues to be given to private pig-keepers but up to date results among Africans have not met with the success for which we hoped, either with regard to rate of development or the standard of pig-keeping. With the end of grain requisitioning in the Northern Provinces difficulty has been experienced in obtaining supplies of foodstuffs for the piggeries and considerably higher prices have been paid; however, the necessary quantities have now been acquired. There was also a serious shortage in the supply of groundnut cake from Kano; the Department was without supplies of this for nearly six months and there was in consequence a serious falling off in the rate of growth of bacon pigs. Groundnut cake is a most important item in pig feeding and the use of increased quantities of palm kernel cake was by no means a satisfactory substitute.

During the year 2,798 pigs were railed to Lagos for bacon processing, compared with 2,973 in 1946; of these 48 per cent were supplied from private pig-keepers. Shika also supplied 165 pigs for breeding purposes; the policy is to keep this piggery primarily for the raising of breeding stock. In addition to home-bred pigs, weaners purchased from settlers at Anchau and from farmers at Dass (Bauchi Province) have been fattened at the Government piggeries. In view of the higher cost of feeding-stuffs the price of bacon pigs delivered at Lagos was increased from 8d to 10d per lb live weight. All Government piggeries showed a profit on the year's working.

9. *Goats and Sheep*.—Only minor work has been undertaken with small livestock, but observations on our farms have given further confirmation that sheep and goats cannot be satisfactorily kept in confinement and that free range conditions are necessary for the health of these animals. This has been particularly borne out at Yandev in 1947.

10. *Poultry*.—Small scale work continues to be carried out at Bauchi, Yandev, Gusau and Ilorin. This generally consists of maintaining small flocks of European breeds and the production of half-bred stock for distribution to local farmers. Large scale poultry breeding is now being concentrated at the new Poultry Centre opened in Oyo Province; the officer in charge of this work has visited the Northern Provinces to obtain information which will enable him to include the requirements of this Region in the scope of his work.

11. *Agricultural Shows*.—Successful shows were held at Daudawa, Kafinsoli, Daura (2) and Misau. The Daudawa show was for cattle only, while the others include crop exhibits and at Misau there were classes also for other types of livestock. It is encouraging to note not only the ever increasing popularity of these shows but also the steady improvement in the quality of cattle exhibited. Shika blood was in evidence among prize winning cattle at Kafinsoli.

PLANNED FARMING — DAUDAWA

12. The settlers on the Government Farm have enjoyed another good season, but it is noticeable that their savings have decreased. This is seen in a reduction in the number of cattle owned and a drop in the amount of credit balance standing in the farmers' individual accounts. This state of affairs is attributed to increased prices of consumer goods coupled with higher standards of living.

The Maska settlement farms have not been altogether successful. This is at least in part due to the attempt which was made to incorporate all existing farmers into the settlement ; these included, as it has now been proved, a number of poor farmers whom we had no power to evict. It seems therefore that in the future where settlement schemes are contemplated it will not only be necessary to make a careful selection of farmers but also to acquire unoccupied land, or if that is not possible to expropriate existing farmlands. Most important of all, powers will be necessary to allow of the termination of leases in cases of bad farming.

Discussions have been held with a view to the financial affairs of the settlers and marketing arrangements being taken over by the Registrar of Co-operative Societies but the lack of staff in that Department has precluded any further advance at present.

AGRICULTURAL TRAINING CENTRES

13. (a) *Riyom Native Administration Farm Training Centre*.—The ten schoolboy students stayed on and completed a second year. One ex-soldier from Gyel was also attached for training. The farm was separated into individual holdings and the students showed pleasing keenness and industry and looked after their cattle well. The students are now being assisted in setting up farms in their own villages, except five who are being given farms in a small village layout which is being made for them at Ganawuri.

(b) *Kafinsoli Training Farm*.—Thirty-two elementary schoolboys attended the course at the Native Administration Training Centre at Kafinsoli ; of these twenty-seven returned to the land and show promise of being satisfactory mixed farmers. In addition twelve ex-servicemen received training and it is proposed to increase facilities for dealing with a larger number of these in 1948.

SOIL CONSERVATION

14. Soil protection measures were continued on most of the Department's research farms, the greatest amount of progress being made at Shika where 848 acres are now completely protected by sixty-six miles of contour terraces. No heavy mechanical equipment having yet arrived it has been necessary to carry out the whole of the work by hand labour. This has continued throughout both wet and dry seasons and the over-all cost has been £4 per acre of land protected. It is estimated that the weight of water held on the protected area of land was three and a half million tons. Clearing and stumping of useless bush have been carried out and grass seed sown between the completed terraces ; eroded areas have been given the additional protection of a grass mulch. Similar work has

been continued on a smaller scale at Samaru and Maigana where 188 and 100 acres respectively have been dealt with. Conservation work at Ilorin was held up by inability to obtain surveying equipment.

The Gyl scheme, financed by Jos Native Administration, was extended further and a total area of some 425 acres was terraced under the general supervision of the Agricultural Officer at a cost of £2 16s 1d per acre. Various difficulties were encountered due mostly to the poor porosity of the soil; some bad breaks occurred during the heavy rains. Although the terracing scheme, after modification, on the whole worked reasonably well, it became evident that it was not sufficiently good to warrant extension to the proposed large scale ten-year scheme for the whole upland Plateau; further experiments have therefore been proposed for the next three years. Furthermore the terracing system used has not proved popular with local farmers as it puts land out of cultivation in an area where good farmland is already all too scarce, even though some will grudgingly admit that crops are better. For this reason less expensive, simpler methods such as strip cropping and grass stripping are proposed for trial next year as well as other forms of contour banking.

Anti-erosion measures take a prominent place in village resettlement schemes and general propaganda in connection with the subject has been continued. In all provinces Soil Conservation Committees have been formed to report on existing evidence of soil-erosion and to make recommendations for both short and long term methods of dealing with this menace.

IRRIGATION

15. Efforts to recruit an Irrigation Engineer are still unsuccessful but the preliminary survey work and the recording of hydraulic data in Bida area have been continued with a view to large scale irrigation for rice growing. Minor irrigation schemes have been extended in Niger Province, mainly in Abuja, Agaie and Lapai Emirates, but also in Bida. Emphasis has been laid on the maintenance of dams and leets in good repair and instruction was given at Abuja to a Native Administration Assistant who had come from another province to learn the work. Small irrigation schemes have been started at Dala Waja in Tangale Waja, Shabbal and Kanawa in Gombe Emirate and at Darazo in Bauchi Division. An instructor was sent to Dala Waja where he is teaching ex-servicemen how to run irrigation farms using the shaduf water lift. The same is being done at Shabbal in Gombe but here ordinary farmers are being instructed. A small experimental dam has been built with stone and cement at Kanawa; here too the use of the shaduf has been demonstrated to the Tereas. A demonstration irrigation farm has been started also at Darazo.

GROUNDNUTS

16. The 1947 groundnut crop proved to be considerably greater than had been estimated in the early part of the season. The general impression had been that, alarmed by a mild threat of grain-shortage the previous season, farmers had this year devoted more land to guinea corn and less to groundnuts; it was also

estimated that yields were reduced owing to the unsatisfactory distribution of rain. These remarks probably applied to most provinces but not to the main Kano area where yields were good and where many nuts normally kept in reserve for local trading are reported to have been sold on the export market. Otherwise Adamawa was the only province whose groundnut crop reached the previous years figure. The net effect of the good Kano crop was to raise the total export crop of the country from 323,000 tons in 1946-47 to 330,000 tons in 1947-48. Our demonstration plots gave very satisfactory yields in all parts of Kano Province and again showed the value of closer planting. The average yields of shelled nuts per acre obtained from these plots are as follows :—

				SHELLED NUTS PER ACRE				
				1943 lb	1944 lb	1945 lb	1946 lb	1947 lb
<i>Southern Belt</i>								
(a)	Close planting	..	..	617	720	599	690	661
(b)	Local Spacing	..	..	473	592	483	507	511
<i>Middle Belt</i>								
(a)	Close Planting	..	..	544	543	735	710	548
(b)	Local Spacing	..	..	502	536	585	435	467
<i>Northern Belt</i>								
(a)	Close Planting	.	..	488	465	696	511	641
(b)	Local Spacing	..	..	386	344	553	437	566

The average increase for all the districts was 116 lb shelled nuts per acre in favour of close planting. It is encouraging to be able to report that these annual demonstrations which are carried out in the twenty-five districts of Kano Province are at last having their effect on local practice ; while the number of people who actually adopt the recommended spacing is still small there is no doubt that a great many have reduced their spacing to something more economical than the usual standard.

In variety trials the strain K38 continued to give a good account of itself though at Daura (where the season was a poor one) the local spreading groundnut gave better results. Previous experiments here have shown promising results for the Bagobira variety. This has been found to comprise strains which vary greatly in their yielding capacity ; these strains have been separated and selections have been made during the past two years with a view to isolating the best of them. Twenty-two strains were tested this year against K38 and the local spreading type. Several continue to show good promise though in this season of poor rainfall their yields were inferior to the local spreading variety.

With the continued demand for increased quantities of oil seeds for export and the possibility of tackling groundnut production on a great scale by means of mechanised cultivation, greater interest is being focussed on the use of artificial

fertilisers ; reference is made to this in the Chemistry Section. Arrangements are being made to demonstrate throughout the groundnut growing districts the value of superphosphate of lime and the technique of using this fertiliser.

The distribution of K38 seed continues in the Kano area but difficulty is experienced in obtaining the return of reasonably pure seed ; a fully organised scheme is required for the re-distribution of selected groundnut seed—such as is practised in connection with cotton—but with groundnuts the difficulties are greater than with cotton as such complete control is not possible.

COTTON

17. Yields were somewhat lower than in 1946-47, due to low rainfall coupled with the early onset of the harmattan ; however conditions were not so unfavourable as was predicted in the early part of the growing season and as regards quality there was an improvement over the previous season. 5,655 tons of seed were distributed, which is a little less than in 1946, but the amount of cotton available for export will be little more than half of the 1946-47 crop. About 18,000 bales will be exported against 33,000 the previous season. The main cause of this decline is the very heavy purchases for the local spinning and weaving trade, in turn caused by continued shortage of imported textiles. Prices were a little advanced on the previous season but local market prices were invariably higher than the gazetted market prices. As in the past a large proportion of the exportable crop came from southern Katsina districts and it will be necessary for Funtua ginnery to supply some 2,000 tons of seed for other provinces. The low crop for export means that much good seed will be lost instead of being available for planned distribution in 1948. This is particularly serious in Zaria Province since purchases in the Bauchi line area, where good quality cotton has always been grown, have been exceptionally low. The ginnery price paid for seed cotton (Grade I) for export was 2.8d per lb throughout the greater part of the season, increasing to 3.3d shortly before the close.

Boll Worm damage was again serious in the main American cotton belt. The scale of attack was similar to that of 1946-47 ; damage generally has been caused by the Sudan Red Boll Worm and in some cases the False Codling Moth as well as the Pink Boll Worm. An entomologist is to be seconded to the Department by the Empire Cotton Corporation to make thorough investigations and advocate remedial measures for dealing with these pests. Meanwhile precautions are being continued in connection with controlling the activities of the Pink Boll Worm.

The Botanist has continued selection work with Strain 26C and observations on some East African strains have been made. The Department continues to use the Daudawa Farm (which was handed over in 1941 by the Empire Cotton Growing Corporation) for multiplication of improved strains of cotton. Successive stages

in multiplication of an improved strain after it leaves the plant breeder at Samaru are as follows :—

First year ..	Stage 0	6-7	acres grown on Government Farm Daudawa.
Second year ..	„ 1	100-140	acres grown on Government Farm Daudawa.
Third year ..	„ 2	600	acres grown by Daudawa Settlers.
Fourth year ..	„ 3	2,500	acres grown in villages around Daudawa.
Fifth year ..	„ 4	10,000	acres grown in one district of Southern Katsina.
Sixth year ..	„ 5	40,000	acres grown in more districts of Southern Katsina.
Seventh year ..	„ 6	160,000	acres grown in most districts of Southern Katsina.

Strain 26C, on which we are at present concentrating, is of value on account of its good ginning out-turn. Of the 1946-47 crop, Stage 0 ginned at 39.11 per cent, Stage 1 at 38.50 per cent, and Stage 2 at 39.18 per cent, as compared with an average ginning percentage for Allen cotton of about 32 per cent. This year Strain 26C has reached Stage 3, in the multiplication scheme and the crop is being purchased by the Katsina Native Administration at a special Daudawa Cotton Market, the area having been scheduled as a Multiplication Area. We expect to recover over 160 tons of seed cotton through this market.

GUINEA CORN

18. Yields from this crop were generally good over the Northern Provinces in 1947 and there was a larger area planted than in 1946. Demand remains high and prices have risen in sympathy with the general increase in wages, export crops, etc. In Zaria market prices were as high as £20 per ton during the period April to June.

Work on Smut disease has continued and copper sulphate treatment was again found to be the only satisfactory control. Mass selection work has also been continued. Investigations were continued in connection with sterility in guinea corn at Langtan in the Shendam Division of Plateau Province ; present indications are that this may be due to climatic factors at the time of flowering.

RICE

19. Lack of rain adversely affected the rice crop in Sokoto where growth is largely dependent on flood waters. Most of the rice planted on higher levels was a failure. On the other hand in Niger and Ilorin there was adequate rainfall and satisfactory crops were harvested.

The Department has continued its work of distributing seed of improved varieties in new areas where this crop is becoming popular and these varieties have already largely replaced the inferior types formerly grown in other districts. G.79 variety, which is purchased from carefully inspected farms in southern Zaria has again been distributed to various parts of the Northern Provinces. The industry is showing definite expansion particularly in southern Katsina and South-east Sokoto.

The Departmental rice mills at Badeggi and Baro handled over 500 tons of rice and nearly 400 tons of milled whole rice was produced during the season ; the balance consists of broken rice, bran and dirt. Owing to the short crop in 1946 it was not possible to purchase sufficient rice for processing at the mills and consequently these did not work to capacity. The Baro mill was therefore closed earlier than usual, and allocation of milled rice to regular customers had to be reduced by 20 per cent. Machinery for operating another mill at Lafiagi in Ilorin Province is now in the country but this project has not yet been started owing to the present high price of hand prepared rice. Help and encouragement have been given to farmers in the construction and maintenance of earth dams in Niger Province where minor irrigation schemes, for the benefit of rice growers, are becoming increasingly popular, especially in Abuja, Agaie and Lapai Emirates. Grants are made from Native Administration funds for this purpose.

BENNISEED

20. The price of benniseed for export was increased from £7 to £15 per ton, but the increase was announced too late to have any effect on the acreage of the wet season crop planted and it was subsequently shown that the acreage under this crop was lower than in 1946, farmers giving priority to food crops. However as a result of the increased price some of the crop which would normally have been consumed locally was marketed for export. There was a large increase in acreage of the dry season crop which was probably the highest on record. Total purchases by firms for the calendar year were 7,169 tons compared with 4,085 tons in 1946.

MILLET

21. The crop was variable, but generally very average yields were harvested in the Northern Provinces. In Kano yields were above average.

SOYA BEANS

22. This crop continues to be grown on a small scale in parts of the Northern Provinces. It has found favour, more than elsewhere, in Benue Province. Ten and a half tons were purchased by firms at Katsina Ala from the 1946 crop and farmers were well pleased with the price of £14 per ton compared with the then existing price of £7 per ton for benniseed. Ten tons of soya beans were also purchased for export in southern Katsina and a smaller amount was produced in southern Zaria. In southern Katsina considerable damage was done by birds which attacked the young growing shoots of the plants.

Thirty-seven varieties were grown and observed by the Botanist with a view to sorting out and multiplying the best types.

TOBACCO

23. The tobacco industry unfortunately suffered a setback in 1947. The markets for Nigerian barn cured Tobacco held by the British American Tobacco Company, in May and June were disappointing. Only 1.1 per cent of leaf

purchased was Grade I. This decline has been cumulative as shewn in the following table :—

					<i>per cent</i>	
1943-44	..	..	..	..	31.8	Grade I
1944-45	..	..	..	..	16.25	„
1945-46	..	..	..	..	6.5	„
1946-47	..	..	..	..	1.1	„

Though the acreage grown was considerably more than the previous season it did not yield the return expected. Comparative figures are given below :—

<i>Year</i>			<i>Total Crop, Zaria Province Cured Leaf lb</i>	<i>Acreage</i>	<i>Out-put per acre lb</i>
1943-44 ..	..	..	86,066	280	307
1944-45 ..	..	..	57,857	200	289
1945-46 ..	..	..	149,047	559	267
1946-47 ..	..	..	167,652	806	208

The three main factors responsible for this decline in quality and out-put are :—

- (a) The poor cash return per man day for tobacco compared with other crops at present.
- (b) The uncertainty involved in carrying over the crop till the following rains. Both in 1946 and 1947 an unusually heavy early rain spoilt much of the tobacco in the barns.
- (c) Sale of leaf to the makers of local “ bookie ” cigarettes.

Planting in 1947 has been on a very much reduced scale, the cultivated acreage being 360 acres only. The British American Tobacco Company have now started to extend tobacco growing in south-east Sokoto in both dry and wet seasons. In August 200 seed beds were put down in Kaura Namoda and planted with Virginia hybrid seed sufficient to cover 50 acres, the intention being to distribute seedlings to farmers for growing under irrigation. Unfortunately early cessation of rain and early start of the harmattan brought about a failure of the seedlings and only enough for 8 to 10 acres were available for distribution. Preparations are being made for a wet season crop in 1948.

CASTOR

24. In spite of propaganda carried out in Idoma and Igala districts of Benue Province for increased planting, less was grown there than in 1946. Total purchases for the calendar year were 645 tons compared with 580 tons in 1946 but the bulk of this was bought during the first quarter from the 1946 crop.

DATES

25. The Government Date Plantation at Fika, established in 1941, continued to make good progress and the first few palms have now come into bearing. Apart from ordinary maintenance work culling of male palms was begun.

SUGAR

26. The sugar industry has had an extremely successful season. Seventy new crushers arrived from India and these were readily taken up. There are now 242 crushers operating in the Northern Provinces and in Kano, Zaria and Sokoto there is a great demand for more.

In Zaria Province, where the largest number of crushers are in operation, cane was in ample supply and reasonably cheap. Manufacturers continue to obtain 6d per lb for brown sugar and are making big profits. Railments from Zaria Province for the last three seasons are as follows :—

1944-45	..	..	..	675 tons slab sugar.
1945-56	..	..	..	627 „ „ „
1946-47	..	..	..	884 „ „ „

Apart from sugar evacuated by rail large quantities are removed by donkey and lorry and total production is thought to be about 2,000 tons in Zaria Province alone. The value of this sugar, at present rates, is around £100,000. This industry, which started as recently as 1940 is now firmly established and extending rapidly with little supervision or experimental work being carried out by the Department.

GINGER

27. A good crop was harvested in Southern Zaria. The usual markets for sale of cured ginger for export were opened and 112 tons were purchased from the 1947 crop. The corresponding figure in 1946 was 103 tons. Large quantities of unpeeled green ginger continued to be railed from Southern Zaria for local use. It has been decided that under present conditions the department is not justified in giving a great deal of encouragement to the production of cured ginger for export but we shall nevertheless continue to provide marketing facilities if these are required. One set of markets only will be opened next season but no pressure will be used in connection with their use. It will then be seen whether the growers generally prefer to cure their produce and sell it for export or to dispose of green ginger locally.

ONIONS

28. This continues to be an important export local crop in Sokoto and movement is still controlled. During the period February to October, 1947, 393 tons were sent out of the province. The corresponding figure in 1946 was 267 tons.

Experiments have been made by the Department to investigate possibilities of improving the seed supply. At present the demand for seed is always in excess of the supply.

WHEAT

29. Reports from Sokoto indicate that a good crop has been harvested in the main wheat growing area. The bulk of the crop is purchased by buyers from Katsina and Kano Provinces where it is taken by camel transport.

POTATOES

30. Railments of graded potatoes from Zaria and Plateau Provinces, the two main potato growing provinces in the Northern Provinces, were as follows :—

				1946	1947
				<i>Tons</i>	<i>Tons</i>
Zaria Province	..	..	..	244	133
Plateau Province	..	..	..	671	396
				915	499

It will be seen that production has declined rapidly. In the Plateau Province this is largely due to lack of seed, farmers showing a tendency to sell seed potatoes for consumption when high prices are ruling ; also wilt disease has been prevalent. In Zaria the sale of potatoes is confined to European trade and growers are inclined to limit production and charge high prices.

SUNFLOWER

31. Enquiries have been received from the United Kingdom as to possible export of Sunflower seed from Nigeria. This crop has been under trial at several Agricultural Stations for a number of years and in some places very satisfactory yields have been obtained. Seed of the more successful varieties has been issued to farmers with a view to obtaining 100 tons for export in 1948.

VEGETABLES

32. Market gardening continues to be a flourishing industry among farmers round the principal towns such as Kano, Maiduguri, Jos, etc. Arrangements have been made to purchase vegetable seeds in bulk for distribution on repayment in the main producing areas.

FRUITS

33. The provision of orchards and nurseries for the raising of fruit trees has been extended and new nurseries have been opened in Kabba, Ilorin and Sokoto Provinces. There is a large demand for mango seeds and budded plants and the Department is concentrating on increasing the out-put from its nurseries. Large scale extension of citrus growing in the Northern Provinces is dependent on irrigation water and until more of these facilities are available the expansion of the industry will be limited. During the year some 4,500 budded and grafted fruit trees were distributed. In addition over 8,000 seedlings and seeds of other fruits were sent out from our nurseries.

FODDERS AND PASTURES

34. With the present staff shortage it has not yet been possible to start any large scale research work on grassland management but observations on the suitability of certain grasses for the establishment of new grazing grounds and

hay-making have been continued. At Maiduguri lucerne has been successfully introduced. Plots sown in 1945 are yielding at the rate of 20,000 lb per acre and those plants which were allowed to do so have produced fully fertile seed. The crop received four waterings weekly during the dry season but trials are now being made with a reduction to one and two waterings per week. In most provinces *Pennisetum pedicellatum* has proved itself, over a number of years, a reliable yielder under varying conditions of weather and rainfall. At Gusau the average yield of dry hay from a one acre plot of this grass over the past seven years was 3,342 lb, while another acre plot which was cut over a period of four years averaged 4,596 lb. At Dambarta in Kano Province an experiment was started for the improvement of village grazing grounds in a closely farmed and heavily populated area ; the whole area was divided into two parts, farmers being allocated one plot in each part and being made individually responsible for control of weeds. The one-half of the area was farmed and the other sown with grass seed and reserved for grazing. Each farmer was therefore responsible for a plot which he farmed and another plot in the grazing area which he would farm in three years' time. Soil conservation measures over the whole area were started early in 1948.

KANO FARM

35. The Kano farm at Nassarawa has now been entirely taken over by Government and all Native Administration interests transferred to a new farm which has been established some four miles north of Kano. Here the mixed Farming Cattle Pool and other Native Administration activities will be centred.

NEW AGRICULTURAL STATIONS

36. No new stations were opened during the year, except a new Native Administration Farm Centre on a modified scale at Bosso near Minna. Considerable progress has been made with the Maiduguri and Yola research stations which were opened in 1946 and financed under the Colonial Development and Welfare Fund. Full details of the progress of these two stations will be found in the 1947 Colonial Development report.

MECHANISATION

37. Preliminary trials with tractors and tractor-drawn implements were made at Samaru and Daudawa in 1947 with second-hand equipment used locally in the construction of aerodromes. These tractors are all of the wheel type and are satisfactory only under certain conditions. Under the heavy conditions experienced in Zaria during the maximum rain period it seems likely that crawler type tractors will be necessary. A tractor and plough were sent to Sokoto late in the year for trials with pre-cultivation of rice lands for which considerable hand labour is necessary under normal circumstances. Early results indicate that there is prospect of success here. An assortment of mechanised equipment is on order and subject to delivery of this experiments on a larger scale will be instituted in 1948.

“ KASHIN YAWO ”

38. The control of Kashin Yawo (*A. hispidum*) by the new anti-growth substances “ Denoc ” and “ Methoxone ” was again investigated at Kano this year using small plots and hand sprayers. The conditions were more favourable this season and highly satisfactory results were obtained, particularly with low concentrations of “ Denoc.” It appears from these preliminary trials that destruction of the young plants is virtually complete but complete control of seed germination is not obtained. On a field scale it is probable that two sprayings per annum would have to be carried out over several years, also that spraying would need to be continued in subsequent years, either annually or after longer intervals, until other vegetation re-established itself. The toxicity of “ Denoc ” and the best type of sprayer for test purposes is now being investigated by an officer of the Department during his leave in England. It seems almost certain that control of this weed will have to be a combination of mechanical spraying and legislation to enforce farmers to keep their land clear.

MINES RECLAMATION—PLATEAU PROVINCE

39. Land shortage, soil erosion and tin mining have combined to make the upland Plateau an area of acute political and agricultural problems. With tin urgently required in exchange for dollars and yet a local indigenous population unwilling to see more of their land destroyed by mining, it has been realised that restoration of mined land for agricultural use should be attempted. Hitherto work has been confined to small scale experiments and a pooling of local knowledge and ideas as to how restoration can be achieved. An Agricultural Officer has spent a considerable amount of time in visiting leases and making recommendations for restoration. Larger scale experiments have been proposed for 1948 for studying the economics as well as the efficiency of restoration methods.

LOCUSTS

40. There were no locust outbreaks in 1947 but a grasshopper outbreak did considerable damage in northern Bornu. The solitary phase of the migratory locust was, as in past years, found in the vicinity of Lake Chad. Ten locust scouts continue to be employed and patrol the dangerous areas of Bornu and Adamawa Provinces.

LOCAL INDUSTRIES

41. The trade in fibre products from the Bida area is steadily mounting and the value of ropes and twines, etc., sold in 1947 totalled over £4,000. Kutigi palm leaf mats are now sold directly to the European firms for export. In Bauchi sales of fibre products amounted to £1,644 as compared with £675 in 1946.

D. H. BROWN,
*for Deputy Director of Agriculture,
Northern Provinces*

II. Western Provinces and Colony

INTRODUCTION

This Annual Report is the first to be written on a full Regional basis and the opportunity is taken in some sections to summarise results and review the position. The work of the region has proceeded on the lines laid down in the Statement of Agricultural Policy (Sessional Paper No. 16/1946). Research on Government farms, demonstration and propaganda by extension work staff, and the provision of improved material have continued, in some cases at an accelerated rate. There is, however, a continual shortage of Agricultural Officers which seriously hampers not only the development and expansion of experimental work and the advisory services which it is desired to give, but also the routine work of the existing organisation. It has resulted in lack of continuity and the necessity for frequent changes of Provincial staff. No single officer of the Senior Service was in fact in uninterrupted charge of any of the Agricultural Stations in the Western Region throughout the year and at times Agricultural Development Officers have been required to carry out the duties of Agricultural Officers.

Mr J. L. B. Kincaid and Mr L. P. Henderson acted in the post of Deputy Director of Agriculture, Western Provinces, the former for seven and the latter for five months of the year.

THE 1947 SEASON

2. Rainfall in the Western Provinces was well above the average and compared with 1946 the conditions were very favourable for annual crops. The late rains, however, were so heavy and continuous that they caused a considerable reduction in the yield of the main cocoa crop through black pod disease.

In spite of the good yields of maize, yams and cassava generally reported from all areas, the level of fixed prices in local markets remained high, although the actual level of food stocks was considered to be better than in the previous year. The following comparative prices for November, 1946 and 1947 recorded at Urban markets in Oyo Province are given below as an indication of the general price level :—

1946 PRICES IN BRACKETS

Commodity	Ibadan	Ilesha	Oshogbo	Ogbomosho	Oyo
Yams per cwt.	(12/-) 7/6d	(7/6d) 13/6d	(4/8d) 9/8d	(4/8d) 4/-	(10/-) 10/-
Maize per cwt.	(9/8d) 9/10d	(11/8d) 9/-	(14/-) 9/3d	(9/4d) 9/4d	(11/4d) 11/6d
Gari per cwt.	(12/7d) 8/9d	(11/8d) 18/-	(10/-) 10/-	(28/-) 16/9d	(11/-) 9/6d
Guinea corn per cwt.	—	—	—	(28/-) 22/4d	(10/7d) 10/-
Palm Oil per tin	(9/6d) 13/-	(12/-) 14/6d	(11/-) 12/-	(14/-) 20/-	(10/-) 14/-

RAINFALL (in inches)

	MOOR PLANTA- TION IBADAN	IFE	ILESHA	OSHOGBO	OGBOMOSHO	OYO
January	0.80	—	—	0.04	—	—
February	0.27	2.01	1.58	2.16	0.95	3.15
March	1.84	4.26	1.89	2.81	1.06	1.42
April	5.11	5.77	4.92	6.45	5.58	7.73
May	8.20	5.19	4.05	3.65	4.74	7.23
June	3.99	6.54	4.40	8.20	9.67	6.85
July	5.19	3.72	2.21	2.31	2.82	5.64
August	12.60	16.53	12.32	12.03	5.86	7.05
September	19.49	5.23	12.40	8.65	9.44	8.21
October	3.58	6.60	6.57	7.86	6.52	5.09
November	0.28	1.65	1.20	1.15	0.75	1.20
December	1.32	0.51	1.46	0.51	0.36	0.36
Total	61.95	58.01	53.00	55.82	47.75	53.93
Average for past years ..	49.41 (38 yrs.)	56.75 (6 yrs.)	45.28 (6 yrs.)	44.72 (11 yrs.)	40.71 (8 yrs.)	45.45 (8 yrs.)

	ONDO	AKURE	OWO	OKITIPUPA	BENIN, OGBA FARM
January	—	0.28	—	0.37	—
February	3.65	3.14	2.80	1.62	2.58
March	2.64	4.35	3.11	8.01	3.62
April	7.90	7.95	9.32	18.36	4.48
May	5.94	7.91	8.20	16.05	7.28
June	8.68	10.32	7.31	13.43	10.12
July	7.06	7.20	4.27	27.25	17.15
August	12.01	10.03	12.31	17.13	18.81
September	13.24	9.25	11.61	15.56	17.45
October	5.13	6.93	4.62	7.66	9.99
November	2.02	0.97	0.50	2.50	2.04
December	1.34	1.52	0.15	—	0.87
Total	69.61	69.85	64.20	127.94	94.39
Average for past years ..	56.36 (5 yrs.)	50.13 (5 yrs.)	49.09 (5 yrs.)	85.49 (5 yrs.)	80.03 (25 yrs.)

ANIMAL HUSBANDRY

CATTLE

3. (i) *N'Dama Breed*.—Mention has been made in previous reports of the valuable attribute of tolerance to Trypanosome infection which the N'Dama breed of cattle appears to possess. The first experimental importation of these cattle was made in 1939, and the performance of the breed was studied at the Ilorin Stock Farm. Subsequently, pure and crossbred progeny of this foundation stock was distributed for observation at other stations and unit farms in the Southern Provinces and Middle belt, where the bulls have been mated with the indigenous Nigerian cattle types.

The experience thus gained with the N'Dama breed indicated that further importations would be justified in order to multiply the breed in Nigeria and provide stock on a larger scale with which to experiment, and at a later stage as it was hoped, to up grade herds of the indigenous cattle. In 1946, therefore, a new Stock Farm was opened near Oyo under the Ten-Year Development Programme, and ninety-three head of cattle, including twenty bulls, purchased in French West Africa were established there. The main function of this new Stock Farm is the multiplication of the N'Dama breed. It is complementary to the Ilorin Stock Farm where more detailed research into Trypanosomiasis and other cattle diseases is being initiated. Few of the cows were in-calf at the time of their arrival in Nigeria and the natural increase of the herd was therefore delayed, but by the end of the first quarter of 1948, thirty-nine calves had been born and have thriven well. The average weights of calves at birth have been 44 lb for bull calves and 37 lb for heifer calves, with subsequent live weight gains of 1.3 lb and 1.2 lb per day respectively.

The cattle are kept on open range and are exposed to natural infection by Trypanosomiasis. They are given additional feeding only in special cases. Seven of the imported stock have been lost from various causes. A setback occurred with the detection of contagious abortion among these cattle. The Veterinary Department has dealt with this outbreak by a policy of segregation based on reactions to the agglutination test only. Four cases of abortion have occurred. Treatment of positive reactors with Strain 19 vaccine has so far given conflicting results. Protective inoculations against the common endemic cattle diseases have been given.

(ii) *Upgrading*.—Whilst pure bred N'Dama cattle are thus being multiplied at the Oyo Stock Farm, the breeding and observation of crossbred types produced by upgrading the indigenous Nigerian cattle with the N'Dama has been carried on for some years, and is still in progress at both Moor Plantation and the Oyo Farm School. At Moor Plantation the cross is chiefly with the small West African Shorthorn typical of the forested areas of the Southern Provinces. At the end of 1947 this herd contained twenty-one male and thirty female half-bred N'Dama cattle and two male and one female threequarter-breds.

At the Oyo Farm School the Sanga type of the middle belt cattle intermediate in size and conformation between the West African Shorthorn and the Zebu, is also being graded with N'Dama. The original thirteen foundation Sanga cows purchased in 1943 and 1944 have since produced twenty-two bull and twenty heifer calves, and eight three-quarter bred calves of the second generation have now been produced. The health record of this herd has been outstanding, and no losses have occurred among the foundation stock for the last five years. Cross-bred bulls have been distributed for stud purposes to many parts of the Western Provinces as well as to Oyo Farm School settlers.

DAIRIES

4. The Yaba Dairy continued to supply fresh milk to the Lagos market, but on a greatly reduced scale owing to the restrictions imposed as a result of the incidence of contagious abortion in our herds. A regular system of replacement

by the railment of in-calf cows from our stock farms in the Northern Provinces therefore could not be followed, and only towards the end of the year were two consignments received from Samaru and Shika. Milk output for the year was limited to 3,686 gallons valued at £923. Sales of vegetables, livestock and sundries, amounted to a further £208.

There were nine live births and five abortions in the herd during the year. Seventeen cows completed their lactations to average 2,169 lb milk in an average lactation period of 332 days, or 6.5 lb per cow per day of lactation. The best individual record was for cow No. W303, which gave 5,029 lb milk in 453 days, at an average rate of 11.1 lb per day.

Two series of agglutination tests for contagious abortion were carried out which revealed five positive reactors. Chemical tests carried out as a routine precaution showed that the fresh milk supplied by the dairy was of good quality and normal composition.

In November a trial was started to test the possibility of grazing the Zebu Cattle at Agege for 4½ hours daily in the open, exposed to biting flies, without causing a high incidence of Trypanosome infection. The times chosen were from 7.0 a.m. to 9 a.m. and from 4.0 p.m. to 6.30 p.m. daily. All stock maintained good health and condition under this treatment until January of this year when three young heifers were suspected of Trypanosomiasis. Examination of blood smears revealed only one positive infection. Treatment consisting of three injections of tartar emetic at five day intervals appeared to give complete recovery. None of the adult stock have so far shown any symptoms of Trypanosomiasis.

The experimental dairy at Moor Plantation, Ibadan was not in operation in 1947 as no negative reactors to the test for contagious abortion were available. The dairy has however since been reopened with fresh cows obtained from Shika.

CATTLE CONTROL, BENIN AND ONDO PROVINCES

5. In Ondo Province, and in parts of Benin Province there exists an important potential Agricultural asset in the shape of indigenous herds of West African Shorthorn cattle numbering very approximately 5,000 and 1,000 head of stock respectively in these two provinces. Far from being of any benefit to the farmer, these cattle, allowed to roam at will, have in the past been responsible for considerable damage done to standing crops, and their value as manure makers was unrecognised. It has now been the policy of the Department for a number of years to persuade the owners of these herds to submit their animals to a system of control and management, whereby damage to farms is eliminated, and under which they can be utilised as a useful source of manure, meat, and in some cases milk.

In order to achieve this, a number of village cattle kraals have been established under Departmental supervision in which the cattle can be confined at night, and from which they can be herded in charge of trained herdsmen in the daytime. Protection from epidemic disease is an essential condition of success, and the collaboration of the Veterinary Department has been invited. As far as possible, the services of Government stock bulls have been provided free of charge, to

improve the type of animal being bred, and in many cases to remedy an acute shortage of adult male stock in these herds, the result of indiscriminate sale and slaughter by the owners for festive purposes of all young bulls as they mature.

In spite of various difficulties this work has continued to expand during the year. The number of controlled herds in Ondo Province now totals forty-one, among which sixteen stock bulls have been distributed.

In Benin Province twelve kraals have been established containing upwards of 440 head of stock. An outbreak of rinderpest occurred among these cattle at the end of the year, but owing to prompt action by the Veterinary Department and possibly also to protective inoculations given in the previous year, deaths were limited to twenty-seven out of a total of 118 animals infected.

The results of applying cattle manure to annual crops are being demonstrated on a number of plots adjoining these cattle kraals, and milking has been demonstrated as opportunity offers. The cost of these schemes, of which the main items are the upkeep of the kraals and wages of the herdsmen, have been shared between the cattle owners and the local Native Administrations.

POULTRY

6. Between 1920 and 1940 work on poultry in the Western Provinces was centred at Moor Plantation, Ibadan, and at the Government Farm, Agege. The main object throughout this period was the production of pure bred Rhode Island Red cockerels for the up-grading of indigenous poultry stocks. Importations of adult birds and hatching eggs were made from the United Kingdom, and some importations of the Australop breed were also made from South Africa.

The work has suffered from the difficulty in maintaining continuity of expert supervision, and our stocks have become progressively weakened by endemic disease. Advantage has now been taken of the opportunity offered by the Colonial Development and Welfare Schemes to establish a poultry centre, which is intended to be the headquarters for centralised research on poultry, and for the distribution through substations of improved strains of poultry throughout the country. A special effort will be made to establish continuity of supervision and research and the Veterinary Department has undertaken to carry out investigations relating to disease and to supply staff for the purpose.

The centre is situated on the same block of land as the N'Dama Multiplication Stock Farm, at Oyo, and development of the site has followed a similar course. Eventually it is intended that research should cover a number of imported breeds, including ducks and turkeys, as well as selected indigenous stocks, but for the time being it is considered essential to concentrate our efforts on one breed only and the Rhode Island Red has been selected as the most suitable. In the meantime a survey of native types of poultry is being undertaken.

In March, 1947, a section of the new centre was stocked with 247 head of poultry selected from existing stock at Moor Plantation, and this stock was multiplied. Further culling has been necessary and the remaining birds will only be distributed for breeding purposes after Veterinary examination. This flock has

however served a most useful purpose in training staff and giving experience of the problems likely to be met in large scale incubation and rearing. New foundation stocks are now being formed by the importation of hatching eggs and day old chicks by air from the United Kingdom. These importations are obtained from certified disease free stocks in the United Kingdom, and are being isolated at the poultry centre. Three consignments each of 100 day old chicks have so far been made with the loss of only one chick. By this method it has been calculated that the landed cost per chick is approximately 2s 7d as compared with £6 each for the importation of adult birds. One hundred hatching eggs have also been imported by air.

PIGS

7. A number of small piggeries, financed from Government funds have been maintained at which to study problems of feeding and management and to produce graded stock for issue to local pig keepers. There is a very keen demand for this stock in most areas. Applicants tend to be of two types, the well-to-do but usually absentee farmer who has the necessary capital for proper buildings and foundation stock, but who finds great difficulty in exercising proper supervision over his enterprise, and the working farmer, who lacks the necessary capital, and is ill-placed to offer satisfactory security for a loan. Further means of assisting this type of prospective pig keeper require to be devised. The present high cost of feeding stuffs is also a factor limiting expansion in the areas less well placed to take advantage of the Lagos market.

FODDERS AND PASTURES

8. *Pasture Grasses*.—With the increased emphasis now being placed on cattle keeping as an integral part of a settled system of farming in the Northern areas of the Western Region, the management and improvement of natural pasture in these areas requires attention. In Oyo district, where annual rainfall averages 45 inches, preliminary observations of the behaviour of a number of indigenous and one introduced species have accordingly been made.

The traditional system of managing the natural grassland in this area consists of burning it some time during the dry season, the date on which burning may begin being decided by native customs. This burning is mainly done in late December or early January which is fortunately sufficiently early to permit considerable regrowth before the onset of the heavy early rains. On poor thin grassland and in overfarmed areas the practice undoubtedly contributes to soil erosion, but in this particular District the practice certainly provides an early bite and good grazing on old grassland, and as a result it has been found possible to maintain cattle on the natural grasses during the dry season, which is comparatively short, without serious loss of condition.

9. *Silage*.—An experiment in silage making was carried out at Agege in order to try out this method of providing a readily available supply of succulent fodder during the dry season. The materials used were maize, and Kyasuwa grass (*pennisetum sp.*). The ensiled product proved to be of high quality and palatability, which was more marked in the case of the maize silage. The maize

was cut when the lower leaves were turning brown and after chaffing, was packed in a circular pit 10 feet in diameter and 6 feet deep. The silage was thoroughly packed and trampled, particularly round the edges, but no water or molasses water was added. Excellent fermentation was obtained and the product was of the "green-fruity" type. Results were :—

Weight of material ensiled	..	..	..	5,108 lb.
Weight of silage recovered	..	..	..	4,320 lb.
Weight loss	..	..	..	788 lb.

The Kyasuwa grass was ensiled in a rectangular pit with concrete walls and floor. A "green-fruity" silage was obtained.

Weight of material ensiled	..	..	..	6,336 lb.
Weight of silage recovered	..	..	..	4,143 lb.
Weight loss	..	..	..	2,193 lb.

Most of this loss occurred at the bottom of the pit where the concrete floor prevented proper drainage. There was also considerable loss around the sides of the pit, and it is concluded that better results should be obtainable in this shape of pit if sloping sides and an earth floor sloping inwards to a central longitudinal drain were employed.

The silage pits were filled and sealed with 6 inches of soil in October, and opened for use in January. 2 lb silage per head per day was fed to pigs, and 10 lb per head per day to the cattle, to supplement little or no grazing plus 3 lb of a concentrate mixture composed of three parts cassava, two parts maize, one part cotton seed, and one part palm kernel meal. The silage was readily consumed, and all stock maintained their condition on these rations.

SOIL FERTILITY AND FARMING SYSTEMS

10. Since the early 1920's, the Department has been predominantly concerned in its experimental work with the design of farming systems which can maintain the fertility of arable soil under continuous cropping with or without the use of farmyard or other manure. This is an obvious prerequisite for the abandonment of shifting cultivation, which becomes progressively more necessary as population density increases in any area. Shifting cultivation in itself is not a bad system from the soil fertility point of view, provided the population is sufficiently sparse to allow of fallow periods of seven to ten years after three years cropping. From the point of view of economic efficiency, however, it is difficult to imagine a farm run as an efficient business on a basis of shifting cultivation, and the introduction of continuous cropping is a necessary first step towards putting Nigerian farming on a businesslike basis.

The first Regional report seems to offer a good opportunity to review progress to date in these researches as far as the Western Provinces are concerned. Owing to the relative scarcity and small size of the cattle in the area and the impossibility of introducing larger Northern or Middle Belt cattle to much of the area on account of the prevalence of trypanosomiasis, emphasis in the early days was laid on the possibility of maintaining fertility by means of green manures and crop

rotation alone. Considerable success was met with on soils of the type found in Oyo and Abeokuta Provinces and the northern part of the Colony, and rotations capable of maintaining soil fertility (at least over a considerable period of years) without having recourse either to manuring or to fallowing, were developed for these areas. These rotations were unattractive to the local farmers, however, mainly because they only gave four main crops in four years, whereas the farmers themselves took six or more main crops in the same period. As the farmers in the areas concerned were not short of land for bush fallowing, it was not possible (or even desirable at this stage of the research) to persuade them to adopt the new rotations.

In the next stage, these early rotations were intensified to give approximately the number of crops the farmers were accustomed to get, and modified to reduce the amount of labour involved, but at the same time to include green manures. Variations on the rotations were introduced to include several different combinations of crops, and to introduce Cassava, an important staple crop which had not previously been included. A review of these rotations in 1945 showed that, with one exception, they were either too intensive and were gradually depleting the fertility of the land, or were otherwise unsuitable. The only objection to the one rotation not subject to these criticisms was that it appeared to encourage the spread of eelworm disease in yams. In 1946, therefore, a new set of rotations was started at Moor Plantation, based on this rotation but designed to remove the yam disease difficulty. These experiments are still continuing, and are at present showing considerable promise, although it is as yet too early to assess their effect on the soil fertility.

In the case of soils of the Benin Sands type, most of the experimental work has been done at Ogba Farm, Benin, and the story here has been very different. We are bound to conclude, as a result of our experiments here, that on this type of soil we cannot develop a system of continuous cultivation without resorting to frequent bush fallows or the addition of manures of some kind. Experimental work here has therefore turned in recent years in the direction of shortening the fallow period by means of planted fallows and of the use of organic and artificial fertilisers.

Although in the early days the possibility of cultivation by animal draught appeared remote, the keeping of the indigenous cattle under conditions in which they would become manure-makers was considered, and the possibility of mixed farming with manure from cattle, sheep and goats applied to the arable rotation was foreseen. Experiments on the use of farmyard manure were therefore carried out. These experiments continue, together with experiments on artificial manures, and are giving useful results.

The possibility of introducing animal draught into the Western Provinces became much more hopeful as a result of tests of the N'Dama breed imported from French Guinea. These animals, considerably larger than the local West African Shorthorn, show a marked resistance to trypanosomiasis. Their introduction and performance described above has led to a change in the direction of our cattle policy in the Western Provinces.

EXPERIMENTAL UNIT FARMS

11. Experimental work of the type outlined in the previous section is to a great extent academic, and its results must be integrated into farm units and tested under conditions comparable with those existing in the local farming community before the results can be considered suitable for demonstration and propaganda work. Early experimental units of this type, based on an area which "could be worked by a peasant family" were operated by paid labour. These farms were unsatisfactory in that the labourers had no personal interest in the farm and that the family labour aspect of the peasant farm was absent. In 1943 and 1944, eight unit farms were started at Moor Plantation which were genuine family units, in which the farmer had sole right to the use or sale of the products of the farm. The farmer was paid a retaining fee of 5s per month only, and in addition a payment of not more than a further 15s to tide him over while certain intended sources of income were in the development stage.

On these farms close investigation is made of the systems used, as regards labour requirements and seasonal distribution of labour, fertility maintenance, economics, and repercussions on social organisation. Detailed records are kept of the sales and consumption of farm produce and livestock, and of the expenditure of the family income. Owing to staff difficulties, it was not possible at first to give the necessary close supervision to ensure accuracy in these records, but in 1946 and particularly in 1947 it has been possible to give much closer attention to this matter, and fair reliance can be placed on the figures for these years.

Each of the eight farms includes an arable holding intended to be sufficient to keep the family in its main requirements of staple foodstuffs, and in addition to this specified projects are included to provide the main cash income. The farms are all small ($7\frac{1}{2}$ to $12\frac{1}{2}$ acres, including $1\frac{1}{2}$ acres fuel and building pole reserve) and apart from a very little hired labour employed at rush seasons, the work is easily accomplished by the family.

The following table gives the net returns for 1946 and 1947 :—

Farm No.	Main sources of intended income	Net income from farm					
		1946			1947		
		£	s	d	£	s	d
1	Sale of arable crops, cattle, cocoa*, firewood and poles, carting for hire.	29	6	3	14	17	11
2	Sale of citrus*, rubber*, sheep, vegetables, firewood and poles	25	4	1	23	8	11
3	Sale of kola*, coffee*, sheep, citrus*, firewood and poles ..	19	5	1	26	12	3
4	Sale of eggs*, poultry*, vegetables, sheep, kola*, citrus*, firewood and poles.	6	14	9	8	5	6
5	Sale of citrus*, palm produce*, sheep, firewood and poles ..	10	9	11	(Closed)		
6	Sale of coconuts, fattened bullocks, sheep, palm produce, firewood and poles.	20	19	1	62	9	10
7	Sale of sheep, citrus*, and other fruit*, firewood and poles ..	20	8	9	(Loss)		
8	Sale of pigs, citrus* and other fruit*, firewood and poles ..	27	18	3	0	14	7
					15	12	2

* Indicates a source of income not yet fully developed, in most cases not yet developed at all.

On reviewing these farms at the end of the 1947 cropping numerous modifications were introduced to overcome defects which experience had demonstrated. In the case of Farm No. 6, based on a fully developed Coconut plantation of $4\frac{3}{4}$ acres, the only important defect was the fact that the farm provides nothing like a full-time job, and this farm is so successful that it may be regarded as suitable for demonstration. (Incidentally, there is considerable evidence that the farmer grossly underdeclared his 1946 income, and that the figure should be more like £40). Farm No. 1, the only one which is cattle-cultivated, did badly in 1947 owing largely to the very bad yam crop in 1946 (brought to account in 1947) but this farm too, when the cocoa comes into bearing, should be a most attractive proposition.

On the other farms, so many sources of income are not yet developed that it is difficult to judge how good they will be, but it is clear that Nos 4. (Poultry) and 7 (Sheep) in their present form are unsatisfactory and need considerable modification. It is likely, however, that Nos. 1, 2, 3, 6 and 8 are all types which should provide an attractive alternative to paid manual labour which at present draws so many of the rural population into the towns. Interesting figures on the expenditure of family incomes have emerged, but unfortunately are not yet fully analysed ; and the farms have given and are giving valuable information on family labour problems.

The process of persuading peasant farmers to adopt farming on these lines is dealt with in the next section.

OYO FARM SCHOOL

12. The Oyo Farm School experiment has now completed six years of training operations, preparatory work having started in 1941. The object is to provide vocational agricultural training for selected elementary school boys of Oyo Division whose educational standards are too low to fit them for salaried posts. Twelve scholarships, valued at £60 each, are granted by Government annually to the Oyo Native Administration and are used to provide subsistence allowance for the first three years and livestock, equipment and cattle pens for the farm on which the boy will eventually settle. The course at Oyo lasts for two years. During the first year the student devotes his time to practical livestock management and to work on three training farms which demonstrate carefully thought-out rotations combined with the use of the plough, farm-yard and green manures, and compost. In the second year each student manages a small farm of his own in a manner similar to that which he intends to follow when he leaves the school.

The progress of the school from the point of recruitment, training and settlement has been variable. The bare statistics are given in the table below and show how difficult it has been at times to obtain the support of pupils, parents and schoolmasters in filling the vacancies. It has on occasion been necessary to fall back on illiterates and an encouraging list of applicants for the 1947 class was followed by difficulty in getting enough suitable recruits for the 1948 class.

The following table summarises the position :—

<i>Class</i>	<i>Literate Applicants</i>	<i>Entered Course</i>	<i>Number Passed out</i>	<i>Number farming, 1948</i>
1942	20	12	12	10
1943	18	12	6	4
1944	17	9	9	8
1945	13	12	11	9
	(7 illiterate)	(7 illiterate)	(7 illiterate)	(7 illiterate)
1946	12	10	10	10
	(5 illiterate)	(5 illiterate)	(5 illiterate)	(5 illiterate)
1947	120	12	—	—
1948	30	12	—	—
		Total ..	48	41

The progress of the former students which is the true index of the success or failure of the school, varies as might be expected, with the ability, character, and energy of the individual. Even though the training may be perfect and the behaviour of the student exemplary, in after life he must stand or fall by his own efforts. At this stage there are settlers in every stage of development, from beginners both promising and unpromising to successfully established mixed farmers and near-failures. It will not therefore be possible to pass final judgement until the scheme is due for review in four years' time. The scheme was, however, considered sufficiently advanced and promising to justify the decision to open a subsidiary training school at Ogbomosho financed from Colonial Development and Welfare Funds. Whatever the final outcome of the experiment, it is now known that N'Dama and Sanga cattle thrive well at the school and the good performance of the main foundation herd is noted at paragraph 4. In addition, the rotations on the three training farms have responded well to the manuring systems employed and in spite of occasional set-backs due to damage by animals, crop yields are now being maintained at a satisfactory level.

A course for twenty-four ex-servicemen was started at the Oyo School in 1947 on lines similar to the ordinary Native Administration course. Twenty-two of these men are still in residence and plans have been made for their settlement where possible in small groups.

OIL PALMS

13. (i) *Oil Palm Research Station*.—A full report of the Oil Palm Research Station is issued separately, as this institute serves the whole of the Nigerian Oil Palm industry. A brief account of its activities is included in the section of this Report dealing with the Specialist sections of the Department.

(ii) *Extension Work*.—A small acreage of palm plantations continues to be established each year. Distribution of 1947 plantings as between provinces was :—

Benin Province	180 acres
Warri Province	22 „
Ondo Province	72 „
Oyo Province	21 „
Abeokuta Province	62 „

Demonstrations of hand operated palm oil presses were given at a number of places in Ondo Province, but failed to arouse much interest, the general opinion being that too much manual labour is required in the process.

During the year investigations were made into the possibility of establishing Pioneer Oil Mills in suitable areas of the Western Provinces and a number of surveys of oil palm densities were carried out in Benin, Warri and Ondo Provinces. Three possible sites, two in Warri Province and one in Ondo Province, were found which, as regards technical requirements, appear suitable. The efficient operation of such mills depends, however, so largely on the degree of local support that they receive that a site cannot be selected in technical considerations alone. The state of local public opinion did in fact necessitate the abandonment of one of the sites provisionally selected in Warri Province and has raised doubts as to the prospects of successful operation in Ondo.

(iii) *Gradings*.—The tonnage of palm kernels graded for export in the Western Provinces, excluding the Colony, for the 1947-48 crop season was 138,690 tons as against 143,301 tons for 1946-47. The reduction of 4,611 was due to a fall of 9,706 tons in the Western Zone ; whereas production in the Benin-Warri area increased by 5,095 tons. The production of palm oil for export increased by 2,193 tons over the 1946-47 total of 29,576 tons in the Benin-Warri-Ondo area, but in the Western Zone the export price did not compete with the prices offered for internal trade and purchases for export were limited to 6 tons.

COCOA

14. (i) *Cocoa Survey*.—Steady progress has been maintained with the preliminary survey of cocoa farms in the Western Provinces throughout the year. The survey is now complete in all parts of the Western Provinces except Oyo Province and Ondo Province. Since the commencement of the survey in 1944 a total of 264,705 farms comprising 361,807 acres of cocoa or 88 per cent of the estimated total acreage have been surveyed. The most important features revealed by the survey during the year are the very marked improvement in the standard of maintenance of farms and the resumption of cocoa planting. It can be confidently expected that the increased prices paid for the 1947 Main Crop will provide an even greater stimulus to planting during 1948.

(ii) *Black Pod Disease*.—Owing to exceptionally heavy and continuous rain during the months of July to September inclusive there was a very severe increase in Black Pod Disease throughout the Western Provinces. The areas most seriously affected were Ondo Province and the Ilesha district of Oyo Province. Losses sustained by farmers in these areas were very heavy indeed and it is estimated that in the Western Provinces as a whole, more than 30 per cent of the Main Crop was destroyed by the disease.

(iii) *Improvement in Quality*.—An extensive campaign to improve the quality and cleanliness of Nigerian cocoa was put into operation in July and continued throughout the remainder of the year. The assistance of the Co-operative and Administrative Departments and Local Authorities was enlisted. The campaign

was organised on a Provincial basis under the general direction of the Senior Agricultural Officer in charge Cocoa Survey. The results achieved were considerably in excess of expectations and reflect great credit on the excellent team work and enthusiasm of all concerned. The following grading returns supplied by the Produce Inspection Section show that there has been a threefold increase in the quantity of Grade I cocoa produced as well as a substantial all round improvement in the standard of fermentation in comparison with the previous year. In addition, contamination with ordure and other extraneous matter has been reduced to negligible proportions.

<i>Percentage slaty Beans</i>	1946	<i>Grade</i>	1947 <i>Main crop up to Dec. 31, 1947</i>	<i>Grade</i>
Less than 5 per cent ..	14.92	I	45.14	I
Less than 10 per cent ..	.94		19.09	II
Less than 15 per cent ..	6.89	II	11.17	III
Less than 20 per cent ..	14.38		13.71	
Less than 30 per cent ..	31.13		6.96	IV
30 per cent and over ..	31.72		3.92	
Total ..	99.98		99.99	

A small test was made at Agodi to find what minimum quantity of wet beans could be fermented successfully. The method used was that used by farmers of fermenting in baskets lined with banana leaves, and quantities ranging from 45 lb down to 15 lb of wet beans were used. Samples of these beans after fermentation and drying were sent to the Produce Inspection Division for examination, and it was reported that all samples were found to be fully fermented. It appears therefore that provided proper care is exercised quantities of wet cocoa of as little as 15 lb can be adequately fermented by this method.

(iv) *Swollen Shoot Control*.—As far as is known, swollen shoot disease is still confined to Oyo Province and several new centres of infection have been discovered by the survey assistants during the year. The cutting out campaign has been considerably speeded up and the stage has now been reached where some of the earlier treated farms are showing negative results on the quarterly re-inspections. It is also gratifying to be able to report that the isolated outbreak in the Ilesha district has shown no further infection since it was treated in May, 1947. Opposition to the cutting out campaign increased considerably towards the end of the year and in some quarters is quite well organised. Most of the recent agitation, however, has arisen not so much amongst cocoa farmers as with other persons who for mercenary motives have elected to oppose the cutting out policy. The farmers, who are the real sufferers in this calamity, have, generally speaking, accepted their misfortune with stoical fortitude and have co-operated with the Department in its most difficult and distasteful task in a most exemplary manner. Since the commencement of the cutting out operations in 1946 up to December, 1947, a total of 217,040 trees have been destroyed. This figure

includes both the initial treatment and subsequent re-treatment of all farms where cutting out is in progress and is equivalent to approximately 542 acres of cocoa.

HEVEA RUBBER

15. A decrease of 965 tons was recorded in the plantation rubber graded in the Benin-Warri area, but production began to rise again towards the end of the year. The prices obtaining at the end of the March quarter of 1948 ranged from 5 $\frac{7}{8}$ d to 8 $\frac{3}{4}$ d per lb as compared with 11d per lb for top grade rubber in 1946, but nearly double what they were in the early months of 1947. Very little Grade I sheet rubber is now being produced.

FRUIT

16. (i) *Nurseries*.—The demand for fruit trees, budded citrus and mangoes in particular, has continued. The following table gives particulars of the more popular types distributed from Government and Native Administration Nurseries in the Western Region and Colony in 1947 :—

	<i>Sweet Orange</i>	<i>Grape fruit</i>	<i>Tangerine</i>	<i>Mango</i>	<i>Avocado</i>
Ibadan ..	1,528	724	—	—	79
Oyo ..	682	282	—	48	54
Abeokuta ..	306	441	—	—	—
Ijebu-Ode ..	57	23	—	—	—
Ondo ..	1,095	83	316	112	110
Benin ..	2,530	598	351	41	10
Agege ..	296	146	83	—	2
Total ..	6,494	2,297	750	201	255

(ii) *Fruit Products*.—The Agege co-operative soft drink factory has had a very successful year. Most of their produce has found a ready sale in Lagos. Monthly production for the last quarter of the year averaged 3,038 bottles of soft drinks per month representing an average monthly revenue of £190. The Blaize Memorial Institute, Abeokuta, in spite of difficulties experienced in obtaining adequate supplies of sugar for manufacturing purposes, continued production of Fruit Squashes and preserves. The following figures illustrate the volume of production and the quantities of fruit utilised by the Institute over the past few years.

<i>Year</i>	<i>Production of Fruit Squashes (bottles)</i>	<i>Lime Juice exported to South Africa (gal.)</i>	<i>Marmalade, Jellies and Jams (lb)</i>
1941 ..	13,411	—	17,321
1942 ..	77,000	—	108,776
1943 ..	213,314	—	79,865
1944 ..	160,387	2,000	153,487
1945 ..	164,121	12,365	11,911
1946 ..	171,766	1,150	1,722
1947 ..	163,249	—	6,372

(iii) *Summary of Fruits Used.*

Fruit			1945	1946	1947
Grapefruit	..	..	74,899	298,301	231,098
Lemons	..	..	19,484	31,342	37,903
Oranges	..	..	1,079,212	1,135,914	806,139
Limes	..	..	5,196,748	1,310,933	530,704
Tangerines	..	..	110,604	49,282	159,716
Pineapples	..	..	11,346	12,774	9,091

RICE

17. Rice farmers in Abeokuta and Oyo Provinces experienced a satisfactory season, and heavier yields were obtained than in 1946. In Benin and Ondo Provinces, however, the yields of both upland and swamp rice were adversely affected by the exceptionally heavy rainfall and high flooding in the swamp areas. In Benin Province the upland rice crop is now well established and farmers in most areas are in a position to obtain their seed requirements locally. In Ondo, the crop is growing in popularity and extending into new areas. In Oyo Province on the other hand the crop is losing ground in the cocoa growing areas and most of the crop is now grown in the Ibadan district. Seventy-seven farmers in Ibadan District bought 1,429 lb of seed rice in 1947. Acreage and production were estimated at 25 acres and 12 $\frac{1}{4}$ tons of paddy.

Propaganda for the extension of swamp rice cultivation in suitable areas has been continued, and both demonstration plots and trial plots have been maintained. At the latter, variety and cultural trials are carried out, and seed is multiplied for issue to growers. The variety G.79 has so far proved the most reliable of those tested for cultivation under swamp conditions.

Mills.—Two Rice Mills, run experimentally by the Department for the benefit and encouragement of local rice growers, were opened during the year at Wasimi in Abeokuta Province and at Ughelli in Warri Province. The Wasimi Mill opened in August and treated 32 tons of paddy up to the end of the year, for which £117 was collected in milling charges. After a slow start, the mill became increasingly popular, and there are prospects of a successful season's working this year.

At Ughelli the mill was opened in September, but has not yet worked to capacity. Some 18 $\frac{1}{2}$ tons of paddy were treated with a milling output of 72.73 per cent clean rice. A third mill at Ondo started operations at the end of the year, and a fourth mill was opened at Ekpoma in Benin Province, in February, 1948. Machinery for two more mills in Benin Province is ready for installation when the necessary technical supervision can be provided.

COTTON

18. The Western Provinces cotton industry has been undergoing considerable changes in recent years and if the Report of the mission which recently toured the

cotton areas is accepted, is likely to undergo even greater changes in the near future. The original native types of cotton were not fully acceptable to the export trade and in the early twenties the Botanical section bred and multiplied the improved Ishan type of cotton which obtained a premium over the native type in the export market. The bulk of the seed supplied to growers was multiplied and issued from the Meko isolation area of Abeokuta. In the past the popularity of cotton growing has varied according to the export price but in recent years the demand for lint for the local spinning and weaving industry has absorbed practically all seed cotton produced, and for two successive seasons the purchases for export have been negligible. The native type of cotton is preferred for the local industry and Ishan has decreased in popularity ; in addition diseases and pest have heavily reduced yields. The selection and multiplication of Ishan cotton will continue and it is possible that an improved middle belt variety may be bred if staff is available. Little, however, can be done until existing mixtures are completely eliminated to make way for improved varieties. The following table shows the course of the cotton industry in the Western Provinces since 1937 :—

COTTON GINNED FOR EXPORT IN THE WESTERN PROVINCES, 1937-47

BALES OF 400 LB. WT.

<i>Season</i>			<i>Ibadan Ginnery</i>	<i>Oshogbo Ginnery</i>	<i>Total</i>
1937-38	..	..	1,752	4,644	6,396
1938-39	..	..	1,093	1,858	2,951
1939-40	..	..	428	1,183	1,611
1940-41	..	..	1,764	3,364	5,128
1941-42	..	..	3,499	11,639	15,138
1942-43	..	..	1,224	6,077	7,301
1943-44	..	..	1,903	4,306	6,209
1944-45	..	..	797	1,852	2,649
1945-46	..	..	782	1,968	2,750
1946-47	..	..	40	—	40

NIGERIAN BIRDSEYE CHILLIES

19. This crop formerly known as Japanese Birdseye Chillies is a luxury crop selected and bred by the Botanical section for the purpose of providing a cash crop for subsistence farmers in middle belt areas where revenue from export crops is scarce. The crop has been confined to the Oyo District in the Western Provinces and the marketing of the crop is controlled under the Capsicums (Inspection for Export) Regulations. Skilled care and attention are required for successful production and marketing, but this extra effort was expected to be offset by the good prices offered for the top grades. The market was known to be limited to the very highest quality and strict attention has been paid to the grading. In 1946 the output could not be graded but was sold as sub-grade chillies under special licence owing to discolouration. The position improved in 1947 but

the prospects of expanding or even maintaining output in a contracting market are not bright. The following table shows the history of the crop so far :—

<i>Year</i>	<i>Tons</i>	<i>Approximate Value</i>	<i>Average Price per ton</i>
		£	£
1942	23	1,782	77
1943	50	3,875	77
1944	87	6,742	77
1945	147	9,915	67
1946	59	Not known	—
1947	89	6,230	70

In 1946 farmers were able to sell part of their ungraded crop for £120 per ton but the export value of the crop to the purchaser after down-grading is not known.

TOBACCO

20. The British-American Tobacco Company have been operating for some time past at Ago Are in Oyo Province as purchasers and curers of locally grown tobacco. The Firm is extending the cultivation of tobacco in the grassland areas of Oyo Province and was able to purchase 152,487 lb of leaf in the Ogbomosho area in the 1947-48 season. Prices of leaf have been raised substantially to encourage production for the 1948-49 season.

TETRACARPIDIUM CONOPHORUM

21. A search for local sources of drying oils as possible substitutes for linseed oil was begun in 1942 by the Chemistry section of the Department. Experiments were undertaken with the seed of *Tetracarpidium Conophorum* (Yoruba—Awusa) a climbing plant sometimes cultivated in the neighbourhood of Ibadan and elsewhere in the high rainfall areas of Southern Nigeria. The seed was found to contain 45 per cent of oil which exhibited very good drying properties. Subsequently samples of various Nigerian oilseeds, including *Tetracarpidium*, were collected and sent for expert examination in the United Kingdom. Preliminary trials to learn more about *Tetracarpidium* as a plant were started by the Botanical section of the Department, whilst information on its distribution and utilisation throughout Southern Nigeria was collected. In 1947 on the instructions of the Secretary of State, trial plots of *Tetracarpidium* were laid down throughout the Western and Eastern regions.

Small trial plots at nineteen different sites have been laid down in the Western region, with the object of testing methods of establishing and cultivating this plant on lines suitable for adoption on a plantation scale. Considerable difficulties are likely to be encountered in that the plant is a luxuriantly growing climber requiring wide spacing, shade and natural support to a considerable height. The experimental work initiated in 1947 is therefore to be continued and expanded.

A. F. W. SHEFFIELD,
Acting Deputy Director of Agriculture,
Western Provinces

III. Eastern Provinces

STAFF AND GENERAL

Staff.—Shortage of trained staff continued to be one of the main factors limiting progress. Although there was some improvement in the staff situation in the latter part of the year when it became possible to station an Agricultural Officer in each Province, except Rivers Province, the total Senior Service staff on duty never exceeded five Agricultural Officers along with one Agricultural Superintendent and one Agricultural Development Officer. It was not possible to station any Specialist Officers in the Region and specialist activities continued to be supervised, and advice provided, by touring officers from Ibadan and the Oil Palm Research Station, Benin. One Senior Agricultural Officer went on leave prior to retirement and at the same time we lost by resignation the service of an Agricultural Development Officer who had done valuable work in Ogoja Province. In the Junior Service, Assistant Agricultural Officers and Senior Agricultural Assistants had to accept considerable responsibility and were given every opportunity to demonstrate their ability. We lost one Assistant Agricultural Officer by resignation and one was invalided out of the service.

2. *New Stations and Prospects.*—A new Experimental Farm was established near Abakaliki in the Ogoja Province, and work during the year, which was of a preliminary nature, consisted mainly of surveying, demarcation of blocks, and the construction of buildings and roads. A certain amount of observational cropping and nursery work was also carried out. It was intended to establish an Experimental Farm and Oil Palm Research Sub-station in Calabar Province, both badly needed, but despite strenuous and protracted efforts to obtain sites no settlement could be reached in 1947. The fact that pressure of population and the land tenure system make it almost impossible to obtain the required land and palm grove in a single block, added to the difficulties, but by the end of the year negotiations for long term leases for several separate but adjacent sites were showing some prospects of eventual success. Plans to establish a series of new local Farm Centres with the object of demonstrating and bringing home more closely to farming communities, all the improved agricultural practices now being advocated, were welcomed and supported by Regional and Provincial Committees, as also were proposals for the concentration of extension work and propaganda in specially selected areas. It is intended to implement these plans as fast as the staff position will allow, with the eventual aim of having at least one Demonstration Farm Centre in each Division, but, although pressure of other work restricted developments, efforts to make a start in 1947 failed mainly owing to suspicion and other political factors.

THE 1947 SEASON

3. Total rainfall was general slightly above average except in parts of the coastal areas and in the Cameroons. The main features of the weather consisted of delayed or light planting rains in March and early April, and abnormally heavy and

continuous rains in many areas during the period August to October. Typical rainfall records are shown below :—

	<i>Umuahia</i>		<i>Uyo</i>		<i>Nkwele Onitsha</i>		<i>Abakaliki</i>		<i>Bamenda (Bambui)</i>	
	1947 <i>ins.</i>	<i>Av. 10 years ins.</i>	1947 <i>ins.</i>	<i>Av. 10 years ins.</i>	1947 <i>ins.</i>	<i>Av. 17 years ins.</i>	1947 <i>ins.</i>	<i>Av. 8 years ins.</i>	1947 <i>ins.</i>	<i>Av. 2 years ins.</i>
January ..	—	0.95	0.10	2.06	—	0.59	—	1.42	0.02	1.58
February ..	4.34	2.05	3.35	3.47	4.06	1.12	2.01	1.68	3.77	0.43
March ..	1.38	4.50	4.25	6.27	0.25	2.30	0.53	1.98	2.18	1.21
April ..	2.99	7.82	7.68	8.38	3.59	6.41	6.10	4.13	11.32	7.41
May ..	9.52	10.41	8.54	11.42	10.06	8.12	13.48	8.87	5.50	10.13
June ..	12.47	12.21	10.67	9.37	14.41	9.28	14.38	9.87	6.25	11.35
July ..	15.37	11.34	10.73	11.67	9.87	10.64	10.20	11.85	10.88	13.28
August ..	15.37	10.30	10.51	11.11	10.89	8.71	11.92	8.92	7.13	9.98
September ..	13.89	13.27	12.66	12.69	14.48	11.30	12.60	13.03	11.47	17.21
October ..	12.57	11.38	7.35	11.32	10.03	9.99	9.22	11.39	7.99	13.59
November ..	3.20	3.49	7.52	5.29	0.34	2.43	1.56	2.55	0.96	1.49
December ..	1.24	0.84	2.42	1.89	0.95	0.47	0.25	0.34	1.16	—
Total ..	92.34	88.56	85.78	94.94	78.93	71.36	82.25	76.03	68.63	87.66

The effect on crop yields was variable, but although yam and maize yields were below average in several areas and flooding caused a certain amount of damage to yams and early planted rice in low lying districts, most other staple crops did well, and on the whole the season was reasonably satisfactory for food crops. Despite the fact that approximately 30,000 tons of garri were railed to the Northern Provinces, there were adequate reserves of cassava which generally yielded satisfactorily, and the heavy rains in the latter part of the season benefitted the coco-yam crop. Food supplies remained normal and no serious shortages occurred, but prices continued on a high level although in some areas the prices of staple foods tended to be lower than in 1946. The season was a favourable one for the oil palm, after two poor years, and yields were above average.

ANIMAL HUSBANDRY

4. *General*.—Livestock improvement and the incorporation of animal husbandry in the farming systems, present special difficulties in the greater part of the Eastern Provinces. Disease, particularly Trypanosomiasis, and feeding problems, are the main limiting factors and the latter must always restrict the scope for livestock in the densely populated areas of poor soil. Early or large scale developments cannot therefore be anticipated, except in the Bamenda highlands, and possibly also in the Ogoja Province where soil conditions are better and there are extensive areas of natural grass.

5. *Cattle, Sheep and Goats*.—Cattle, sheep and goats continued to be maintained in small numbers on Umuahia and Nkwele Farms and on six experimental family holdings, with the object of investigating feeding, management, and disease problems, and providing farmyard manure for manurial experiments. Grading of Nigerian Shorthorn to N'Dama cattle continued; the limited evidence so far available tends to show that the N'Dama is not inferior to the local stock as far

as tolerance to Trypanosomiasis is concerned, and is of course much superior in size and economic value. At Umuahia, although the infertility of an N'Dama bull caused a set back in breeding, it was a reasonably successful year for livestock. Losses from disease, except among goats with which we have not yet had any success when kept under conditions of confinement, were comparatively low, and cattle and sheep stocks maintained excellent condition; the latter had a particularly good year. At Nkwele, there was a very high mortality among calves, to which *Ascaris* infection was a contributory cause, and also a high death rate in the sheep flock the causes of which could not be accurately ascertained. Losses from Trypanosomiasis were however nowhere high. Agglutination tests for contagious abortion on cattle showed a high incidence of reactors at both Umuahia and Nkwele.

In Bamenda with its promising prospects for development of cattle husbandry and mixed farming, cattle improvement work at Bambui Farm was continued in close co-operation with the Veterinary Department. Hitherto White Fulani and Sokoto Gudali bulls ex Shika had been used as sires on the foundation breeding stock but, as results obtained with the crosses were not encouraging and further experience has shown that the Adamawa (Gudali) breed is the most promising under local conditions, it was decided during the year to concentrate on this breed. Selected Adamawa (Gudali) bulls are now being used in the Bambui farm herd. The breeding policy at Bambui differs slightly from that at the Veterinary Department station at Jakiri, in that the former has as its objective the production of a good dual purpose beast best suited to the settled mixed farmer, while at the latter the emphasis will be placed on a hardier type suitable for the open range conditions of a pastoral industry, possibly modified to the extent of dry season silage feeding on the ranges.

The total cattle stock at Bambui at the end of the year after fairly rigorous culling amounted to 158, including forty-four mature breeding females and forty-five heifers and heifer calves. The adult stock maintained satisfactory health and condition and there were no deaths from disease among them; mortality among calves amounted to ten from forty-nine births, and of these seven died from scour. All animals were tuberculin tested during the year and reactors were slaughtered. Average milk yields were disappointingly low, the highest on the basis of a 280 day lactation, being 230 gallons and the lowest 54 gallons. Average monthly live weight increases of calves under 300 lb varied from 11 lb in February to 23 lb in May. An interesting development on the management side has been the gradual replacement of Fulani herdsmen by local natives of the area, who are proving genuinely interested in cattle and, with instruction, make capable herdsmen.

6. *Pigs*.—The keeping of European breeds of pigs, or grades, under fly proof conditions, offers promising prospects in areas where trypanosomiasis is endemic, although there are certain difficulties, notably feeding, still to be overcome. The greatest difficulty, given good management, is the shortage of cheap protein food, and large scale development is dependent on supplies of protein concentrates at economic prices, particularly groundnut meal which has not hitherto been available in sufficient quantity even for current requirements.

Experimental fly proofed piggeries were continued at Umuahia and Nkwele with generally promising results, and no serious disease or other problems, apart from those connected with feeding, have yet been encountered. Breeding stock is provided for issue to private fly proofed piggeries and an almost embarrassingly keen interest is being shown in this project. At the present stage of our investigations, however, and until groundnut meal becomes available in greater quantity, it is necessary to limit the many applicants for stock and assistance to those who can obtain adequate food supplies and erect buildings of the required standard. Seven approved private piggeries received stock, advice, and assistance during the year, and in spite of indifferent management and a tendency to try to cut costs by cutting rations, some succeeded in operating at a profit. Others, however, found themselves in difficulties through bad management and being too ambitious in their plans.

Feeding and breeding trials with pigs of the Large White, Berkshire and Tamworth breeds continued at Bamenda, but little progress was made in the introduction to farmers of pig keeping by more intensive methods with improved stock. Nine breeding animals were distributed during the year but only one farmer is making a success of the project so far.

7. *Poultry*.—The supply of improved poultry remained a popular part of our work but, despite strenuous efforts to increase Rhode Island Red breeding flocks and step up production, in which we were handicapped by disease and the need for new blood in existing stocks, supplies still fell far short of demand. Unfortunately also, there is yet little evidence that prospective poultry keepers are prepared to give the improved management and feeding necessary for the successful exploitation of pure or cross bred birds; this restricts the usefulness of this line of work. During 1947, 140 Rhode Island Red cockerels, 130 pullets, and 500 hatching eggs were distributed from Umuahia and Nkwele Farms.

8. *Fodders and Pastures*.—Observation plots of a variety of fodders including legumes and pasture grasses were maintained at Umuahia and Nkwele and data concerning management, yield and palatability were collected. Manurial and management trials were also continued, and organic and inorganic fertilizers including lime all produced substantial responses. The results indicate that heavy manuring is necessary to maintain productivity especially of fodder plants on acid sand soils. *Panicum Maximum*, *Andropogon Gayanus*, *Andropogon Tectorum*, *Pennisetum Pedicellatum*, *Melinis Minutiflora* (Molasses grass), *Purpuraria Javanica*, and *Centrosema Pubescens*, have so far proved the best from the point of view of yield and palatability of those species tried at Umuahia where the soil is too poor to support elephant grass successfully. Molasses grass should be particularly useful as it appears to thrive on the poorest of the acid sand soils on which it also occurs in a natural state. At Nkwele, where elephant grass can grow well, experiments in frequency and heights of cutting, and on burning with the object of accelerating early growth, have not yet produced definite results. Spear grass (*Imperatum Cylindrica*) has become a menace in all pastures and fodder grass fields, and investigations regarding economic methods for its eradication are in progress.

Observation on local grasses and on a number of introduced species, and investigations on the improvement and management of pasture, were extended at Bambui. The latter include a series of trials of controlled grazing at different rates of stocking as well as observations of the effect of various treatments such as early and late burning compared with early and late cutlassing. It is yet too early to draw any useful conclusions from this work; among the introduced grasses, however, Kikuyu grass appears to have the most promising potentialities, although its rate of natural spread when planted in pasture has been disappointing.

Following previous successful results with silage at Bambui, eight pit silos filled with young unchopped elephant grass in the rains of 1946 produced 29 tons of good silage which was readily eaten by the cattle in the following dry season. Trials of simple and cheap methods of silage production, with different materials and mixtures were also extended at Umuahia, Nkwele and Abakaliki. Preliminary inspection of the products indicated that in most cases they were satisfactory, and there appear to be reasonably good prospects for developing silage production as a practicable and economic method of utilizing grass and forage legumes for dry season feeding.

SOIL FERTILITY

9. *General*.—Experimental work on the complex and pressing problems connected with the improvement of soil fertility, particularly on the acid sand types of soil, which was already in progress on a substantial scale, is being expanded as rapidly as possible. The experimental programme at Umuahia and Nkwele Farms includes comprehensive investigations concerning organic manures and natural residues, shrub fallows and ground covers including legumes, inorganic fertilizers and lime and general husbandry with rotations. Intensive work on chemical fertilizers had to be discontinued during the war but was resumed in 1946. Although considerable progress has been made in the last ten years and valuable results achieved, soil fertility problems are becoming increasingly urgent and much remains to be done especially in the way of fundamental research. Detailed results and technical discussion of this work cannot be presented in this report, but it is hoped to publish these in a Departmental Bulletin as soon as staff shortage and pressure of work allows.

10. *Inorganic Fertilizers*.—On the heavily farmed densely populated soils of the acid sand type, with their low reserves of plant nutrients, the use of inorganic fertilizers is likely to be essential eventually in order to achieve and maintain the increased productivity necessary to support a dense population. In addition to the more comprehensive and complicated experiments in progress at Umuahia and Nkwele, seven very simple semi-demonstrational experiments, and one more elaborate one, were carried out at sites specially obtained for the purpose, and representing typical soil types, in Calabar, Owerri and Onitsha Provinces. In these simple experiments the treatments were designed in such a way that we felt reasonably confident that they would all give better results than no manure, and although substantial responses in crop yields were obtained in most experiments, the simple design restricted their statistical value. However, these trials achieved one of their main objects, which was to stimulate the interest of local farmers and

overcome their suspicion, thus making it easier to obtain full rights over the use of typical farming land for the purpose of more comprehensive experiments to follow. Much interest was shown in all the experiments and farmers were greatly impressed by the substantial increases in yam yields produced.

Various combinations of fertilizers gave substantial and highly significant responses at Umuahia and Nkwele, but the relative importance of Nitrogen, Phosphate, and Potash, on different soils and crops have not yet been clearly established, and have varied considerably in different experiments. Significant results were obtained with Nitrogen alone at Nkwele, and with Potash alone on yams at Umuahia, but Phosphate alone did not produce significant responses anywhere.

In the simple experiments at the outstations treatments consisted of an arbitrary basal dressing of three of the four main fertilizers N.P.K. and Lime to which the fourth fertilizer was added for purposes of comparison in arbitrary single and double dressings; these three treatments were compared with no manure. Selection of the variable fertilizer was based on soil analysis. Of the two experiments in which Potash was the variable one gave no significant results and in the other a double dressing of Potash ($1\frac{1}{2}$ cwts of Muriate of Potash per acre) was significantly better than the basal dressing (N.P.Ca) alone. In the experiments with Nitrogen as the variable both single and double dressings ($1\frac{1}{2}$ cwts and 3 cwts of Sulphate of Ammonia respectively) gave significantly better results than the basal dressing. In those with Phosphate as the variable there were no significant differences compared with the basal dressing.

The standard ingredients for the basal dressing consisted of $1\frac{1}{2}$ cwts Sulphate of Ammonia, $1\frac{1}{2}$ cwts Super Phosphate, $\frac{3}{4}$ cwt Muriate of Potash, and 10 cwts of burnt lime. These were also the quantities of single dressings of the variable fertilizer which was of course omitted from the basal mixture in the appropriate experiments. In all but one experiment the basal dressing produced substantial and significant responses compared with no manure as shown by the following samples of the results, with a yam test crop in all cases :—

(a) Site—Ezza (Abakaliki Division)—Variable fertilizer=N. Basal=P.K.Ca.				
Treatments	No Manure	Basal dressing	Basal+1 N	Basal+2 N
Yields lb nett per acre.	868	1,810	4,614	6,338

(b) Site—Aba—Variable fertilizer=K. Basal=N.K.Ca.				
Treatments	No manure	Basal dressing	Basal+1 K	Basal+2 K
Yields lb nett per acre.	5,134	6,632	6,894	7,926

(c) Site—Abak—Variable fertilizer=P. Basal=N.K.Ca.				
Treatments	No manure	Basal dressing	Basal+1 P	Basal+2 P
Yields lb nett per acre.	3,480	6,868	6,896	6,632

While results so far are distinctly promising it is clear that we have still a great deal to learn about the effects and economics of chemical fertilizers before we shall be in a position to give sound advice on their use and on the most economic

dressings. An encouraging feature of this year's results on the economic side is the fact that, in six of the seven experiments on ordinary farming land in the Provinces, the application of fertilizers, even with the arbitrary dressings employed, resulted in a monetary profit. For instance in the experiment at Ikot Ekpene the value per acre of the extra yield of yams obtained, based on the actual selling price, exceeded the cost of the basal dressing of fertilizers including application costs, by £3 4s per acre.

11. *Lime*.—Experimental work over a long period with lime of local origin on acid sand soil, has proved that a single dressing of 10 to 20 cwts per acre of burnt lime results in substantial increases in crop yields, which are sustained for as long as fifteen years, when, of course, combined with other means of maintaining fertility. In view of the definite and lasting responses to comparatively small dressings it is possible that in addition to reducing soil acidity part of the effect of lime is to supply calcium, in which Eastern Provinces soils are deficient, for utilization by the plants, but this is a point on which fundamental studies are required. However, as ample evidence of the value of lime is now available, a start was made on a widespread series of demonstrations in co-operation with farmers as a necessary preliminary to the encouragement of its use. A lime burning venture, started by the Department at Awgu some years ago, and now operated by the Native Administration, provided the required supplies of burnt lime. The demonstrations were confined to soils with a pH of under 5.0., preliminary tests being carried out before selection of a site. Owing to the usual suspicion that Government's object in undertaking this work was "to acquire the peoples' land", which caused many farmers who had agreed initially, later to refuse to allow lime to be applied to their farms, the scale of demonstrations carried out was less than had been hoped for. Small quantities of lime, usually sufficient to treat up to about one-tenth of an acre, were, however, issued free to eighty-seven farmers in Onitsha, Owerri and Calabar Provinces, and applied to part of their farms.

Although striking differences in favour of the limed section were apparent in a number of farms particularly in Onitsha Province and parts of Owerri Province, the visible effect on the growing crops in the first year proved to be less obvious than was anticipated especially in Calabar Province where there were few marked vegetative differences. Suspicion rendered farmers reluctant to allow weighing of the crops, but the few yield records obtained, mainly from Onitsha Province, showed increases in yam yields varying from 7 per cent to 80 per cent. It is not always easy to assess by eye any but very substantial differences in small irregular plots carrying mixed crops, but in this connection it is of interest to note that in many cases where our own observers could notice no great difference between the limed and unlimed portions of the farms, the owners always held that the limed parts were superior, and where weighing was possible their opinions were confirmed. With few exceptions the reaction of farmers has been favourable, and the majority appeared to be fairly well satisfied with results, so that provided supplies can be made available at reasonable cost, there should be favourable prospects of creating a demand for lime. Suspicion

among the people regarding our motives in demonstrating lime is diminishing with propaganda and the example of the 1947 volunteers. Investigations were started concerning machinery for production of ground limestone, which is likely to be the best and most economic form of lime for local development for agricultural purposes.

12. *Organic Manures and Improved Shrub Fallows*.—Information continues to accumulate on the value of, and most economic ways of using, organic manures and natural residues of all kinds and improved shrub fallows. Compost and farm yard manure have almost always produced spectacular increases in crop yields, but frequent and fairly heavy dressings are required to maintain fertility at a reasonably high level on average soils. Under intensive cultivation biennial dressings in the region of 4 tons farmyard manure or 6 tons Compost per acre, or their equivalents, preferably with initial liming, are usually the minimum required. *Acioa Barteri* remains the best shrub fallow from all aspects yet tried, and there is no doubt that, over a wide area where natural bush fallows are deteriorating through pressure on the land, the more widespread and systematic use of this shrub could in itself raise productivity considerably. Investigations concerning its establishment and management are providing useful information, and long term experiments to determine the optimum lengths of fallow are in progress. An interesting trial is in progress at Umuahia with the object of obtaining some indication of the reserves of plant nutrients capable of being tapped by this deep rooting shrub. *Acioa* in an acre plot has been cut back annually for the past seven years; all leaves and branches are carried off and weights recorded, and nothing is returned to the plot. So far the shrub has shown no signs of diminution of vigour or productivity. Very little progress has yet been made, however, in efforts to encourage the farming community to extend the use of improved shrub fallows, or to adopt methods for the conservation and use on the land of refuse of all kinds of which there is very considerable waste.

13. *Soil Conservation*.—Long term cultural experiments on anti-erosion, and general soil conservation and reclamation measures, were continued at the Agulu Soil Conservation Centre, as well as on Departmental Farms. Results at Agulu so far confirm that contour ridging, if correctly carried out and maintained, is the best method of preventing erosion on sloping farm land of this type. Wave bedding is almost as effective, but is only suitable where farming cannot be done because of difficult contours, or near gullies. An experiment in controlled farming at Ekwulobia was fairly successful. Farming in the controlled area was only allowed subject to compliance with soil conservation rules, and although land tenure difficulties rendered the strict observance of all the conditions impossible, 109 farm plots, totalling twenty-one acres, were cultivated on the contour. The farmers were quite pleased with results, and had no serious objections to observing the rules. There were some signs also that contour ridging was catching on outside the controlled area. An attempt to get the people themselves to undertake planned reclamation of poor and eroded farming land at Isuochi in the Okigwi Division was also continued, but, mainly owing to land tenure difficulties, little progress was made during the year. Of fourteen shrubs and trees tried at Agulu as

ground covers and soil regenerators *Acioa Barteri*, *Baphia Ntida*, *Gmelina Arborea*, and *Cashew* proved the best as regards ease of establishment, and Molasses grass continued to show promise as a ground cover. The quick growth of Cashew was remarkable, and this tree may have a future as an economic forest crop for the poor eroded soils of Onitsha Province.

THE OIL PALM INDUSTRY

14. *Production and Export*.—It is satisfactory to be able to record substantial increases in purchases for export of both palm oil and palm kernels. In the Eastern Region, during the calendar year 1947, 130,966 tons of palm oil were graded, compared with 99,357 tons in 1945, and 102,079 tons in 1946. During the same period gradings of palm kernels amounted to 164,095 tons compared with 144,803 tons in 1945, and 142,684 tons in 1946. These increases are believed to be mainly due to the favourable season and higher yields of palm fruits, but the increased prices which became effective earlier in the year encouraged production. They may also have caused some diversion of palm oil from local internal consumption to the export market, but there has been no reduction in recorded figures for railings of palm oil to the Northern Provinces, which amounted to 9,543 tons in 1947, compared with 7,742 tons in 1946.

15. *Oil Palm Cultivation*.—Although active propaganda to encourage palm planting is in abeyance because of soil fertility problems and shortage of improved seedlings, the spontaneous and steady demand from farmers for all available supplies of seedlings continued, and 14,100 improved seedlings representing approximately 235 acres, were purchased and planted by over 200 farmers. In addition, about seventy-five acres are known to have been established with bush seedlings on plantation lines. Experience has shown that owing to the limits to the advantages of cultivated palms imposed by soil fertility difficulties, it is necessary to maintain a high standard of improvement in respect of oil palm planting material, and although everything possible is being done to increase production, supplies are still very limited, especially with the demands of large scale projects such as settlement schemes. Assistance and advice to planters on establishment and maintenance continued to be provided, and in this connection although our assistance is generally sought and welcomed, several purchasers preferred to make their own planting arrangements, because of still lingering suspicion of Government's motives concerning land.

16. *Oil Palm Research*.—Oil palm research in the Eastern Region is catered for by the Oil Palm Research Station, Benin, which also exercises general supervision over these local activities. Details of the latter are contained in the annual report of this station which is issued separately and a brief account is included in the report on the Specialist sections of the Department.

17. *Machinery*.—The keen demand for palm oil presses continued to increase in many areas, but unfortunately there was no great improvement in the supply position during the year; in this connection it is interesting to record that a number of presses obtained from the firms were resold by the purchasers at enhanced "black market" prices. The situation was aggravated by the fact that a high

proportion of existing presses were out of use through wear and breakage, and many of these with long service were beyond repair. During 1946 and 1947 a total of 477 new presses were issued for sale from Calabar, which was the assembly and distributing centre for stations east of the Niger. The total number of presses recorded as in use at the end of 1947, and excluding 125 out of order, was 860. Hand nutcracking machines are still not very popular for reasons explained in previous reports, and an even higher proportion of existing machines was out of order and beyond repair; out of a total of eighty-two recorded, thirty-five were unserviceable.

All possible assistance was provided by the Department in the selection of sites for, and the introduction and operation of, Pioneer Oil Mills. Details of these projects, which are now under the direct control of the Department of Commerce and Industries, are outside the scope of this report, but the greatest importance is attached to this work and it has occupied a good deal of the time of the Agricultural Department staff.

OTHER CROPS

18. *Cocoa*.—Following a tour made early in the year to investigate and advise on cocoa cultivation, the Principal Research Officer, West African Cocoa Research Institute, indicated an area of over 3,000 square miles in the Cameroons, and a smaller area in the eastern part of Ogoja Province, which might be suitable for permanent cocoa cultivation. On his recommendation, a survey of all existing cocoa in the Cameroons was started towards the end of the year, and plans were made to start preliminary experimental and demonstration work in 1948. A beginning has been made in the Obudu district of the Ogoja Province by the establishment of a small experimental plot of cocoa. A survey of the comparatively small areas of existing cocoa in Owerri and Calabar Provinces was completed.

19. *Rice*.—There has again been marked development and expansion of the rice industry in Ogoja Province where rice was not cultivated prior to 1943, and the estimated area under this crop increased to 4,500 acres from 2,000 acres in 1946. In Onitsha Province the estimated acreage was just over 7,000, representing a 10 per cent increase over last year. Yields in general were satisfactory, and figures obtained from sample recordings in Ogoja Province showed several yields of over one ton of paddy per acre. Guiana 79 seed was again distributed to growers but on a reduced scale as the purity of available supplies is not very satisfactory. Seed farms, totalling eighteen acres, were established by the Department in both Onitsha and Ogoja Province rice areas, and from these by continual roguing, purer Guiana 79 seed is being produced for distribution to farmers. A small irrigation experiment, in which a portable motor pump was used in the cultivation of ten acres of dry season rice, was started towards the end of the year at Ikun on the Cross River in Afikpo Division.

Little or no progress has yet been made in encouraging rice cultivation in Calabar and Owerri Provinces where the people complain of the hard and unaccustomed work involved, and lack the incentive to enter the swamps and cultivate the crop. Trial and demonstration plots of rice were continued but it was

a disappointing season in these areas due to abnormally high water levels and excessive flooding in September, and as a result crops in many of these plots were poor.

The labour involved in hand hulling is often a deterrent to expansion of planting, although at present market prices, rice offers an attractive source of income to the farmer, and there is a pressing demand for processing machinery. Two Grants No. 7 Rice Mills, which arrived during the latter part of the year after a long delay from the time of ordering, will be operating in 1948 at Aguleri in Onitsha Province and Okpoha in Ogoja Province. These mills will be worked by the Department in the initial stage for testing and demonstration, but it is intended to hand them over to some form of local enterprise as soon as they are proved to be sound and economic concerns.

20. *Fruit*.—Budding of citrus and other fruits was carried out at Departmental farm nurseries, and also at many Native Administration nurseries. Supplies of budded plants were again insufficient to meet the demand which, among Africans, is still mainly for oranges, so that some rationing of supplies was necessary. In all, and including seedlings, 6,000 citrus, 630 mango, 5,300 kola, and 940 miscellaneous other fruit trees were issued from Departmental and Native Administration nurseries during the year. Special efforts have been made to try to ascertain what the people want in the way of fruit and to ensure that increased supplies are available in 1948.

Railings of oranges to the Northern Provinces from line stations in Owerri Province amounted to 2,051 tons in 1947 compared with 3,342 tons in 1946.

21. *Cinchona*.—In view of recent developments with synthetic anti-malarial drugs and the probable restricted scope of future demand for quinine, major experimental work on Cinchona which had been in progress at Esosong, in the Kumba Division of the Cameroons, and at Bamenda, was closed down in the latter part of the year. We are, however, continuing to maintain a few small observation plots of superior varieties which will provide information which might still be of use in the future.

22. *Linseed*.—Crop variety trials to test the suitability of new introductions to high altitude conditions, were continued at Bambui, Bamenda, and in view of the current world shortage and demand for linseed, special attention was paid to this crop as far as seed supplies of available varieties would allow. The yields obtained so far, however, are very low, and prospects of developing the crop are not promising unless better cultural methods can be evolved, or a variety more suitable for the local conditions found. Arrangements have been made to obtain and test further varieties in 1948.

MISCELLANEOUS

23. *Settlement Schemes*.—The Department continued to assist the Bamenda-Cross River-Calabar Settlement Scheme on the Calabar-Mamfe road with staff, advice, and planting materials. In this scheme there are two settlement areas one of which comprises 300 acres as the site for the first holdings, providing experience on which to base development of the main area where it is intended to establish 200 family holdings. A few prospective settlers in the small trial area commenced

farming operations in 1946 when eighteen acres of oil palms were established through food crops. This area was again used for food crops in 1947 but thereafter annual cropping will be discontinued, and it will become part of the oil palm block. Losses among palms were high mainly as a result of neglect by the settlers. A block of 120 acres was examined in detail, marked out into ten holdings, and on these in December eight settlers were clearing for their new compounds.

In the main area 140 acres of oil palms planted with improved seedlings, were successfully established with a very low mortality, and 28,000 seedlings were supplied and planted in nurseries for use next season. Including seedlings supplied in 1946 which were too small for planting out in 1947, there were about 30,000 surviving seedlings in the nurseries at the end of the year. It is planned to plant a further 400 acres of palms in 1948. Communal food farms were established in part of the 1947 oil palm area and comprised in all about sixty acres. Yam yields on the whole have been disappointing, the average yield recorded being 3,500 lb gross per acre. The yield of a trial plot of swamp rice, which looked very vigorous in the field, did not fulfil expectations and was only 864 lb paddy per acre. With a labour rate of 1s 4d per day, the growing of food crops in communal farms was not an economic proposition, and a different cropping system will be used in 1948. Owing to the nature of the terrain, and the heavy secondary forest cover, it will be some time before individual holdings are finally demarcated. The final layout, size, and organisation of these, must depend on further experience, but the aim is at present to organise each family holding on the following lines:—

5 acres oil palms (in a separate 1,000 acre block)

1 acre Fuel reserve.

1 acre Compound garden, etc.

2 acres—cash crops—citrus, kola, etc., and possibly grazing and forage crops for livestock.

6-8 acres—Main food crop rotation area, including three years' shrub fallow.

15-17 acres.

24. *Agricultural and Economic Surveys*.—Owing to pressure of other work Senior Service staff had little or no time to devote to the preliminary agricultural and economic surveys referred to in last year's report, and progress has been held up pending analysis and correlation of the store of information already accumulated. In order to acquire information essential for the planning of both research and development work connected with the oil palm industry, especially in the dense palm grove areas of Calabar Province, arrangements are being made to carry out detailed field surveys. A Senior Assistant Agricultural Officer has been detailed for the purpose in Calabar Province. By the end of 1947, however, the survey had not gone beyond the stage of preliminary work and propaganda, though an area of twelve square miles in the Uyo Division was selected for the initial work.

J. W. WALLACE,
Deputy Director of Agriculture,
Eastern Provinces

IV. Specialist Sections (Botanical, Chemical, Entomological and Oil Palm Research Station)

Botanical Work

(a) IBADAN

1. This section continued to be responsible for botanical work (with the exception of work on oil-palms) in the Western and Eastern Provinces. During much of the year only one qualified agricultural botanist was stationed at Ibadan and the work was restricted to a compass which he could supervise. Experimental work in progress was maintained but little advance into new fields could be made. A start was however made with a programme of work on food-crops in the Eastern Provinces, an Assistant Agricultural Officer and supporting junior staff being posted to Umuahia to work under direction of the Botanist, and at Ibadan plant pathological investigations were resumed after a gap of several years.

The failure of rains in 1946 left the permanent crops on the experimental plots at Ibadan in poor condition and this was reflected in subsequent low yields. The year under review provided abundant rainfall, 64.6 inches being recorded at Moor Plantation as against a mean rainfall of 43.4 inches for the previous ten years. Most of this excess came in August, when 13.4 inches fell in place of the usual short dry season, and in September when there fell 20.0 inches. The dry season which set in during November was interrupted by one or two good showers in December. The effect of the extra rainfall was well marked on the permanent crops, and cocoa especially looked very much better at the end of the year than at the beginning.

COCOA

2. A start was made with the extensive propagation of the local improved selection T38 in order to provide clonal material for multiplication plots. Cuttings were rooted for a planting of two acres on hill top soil at Moor Plantation, while for a larger area at the Ibadan Native Administration Cocoa Farm seedlings growing in baskets were budded. The young cocoa on Moor Plantation planted on rather light soil suffered especially from drought early in the year, and the local selections, Trinidad introductions, and their progeny all gave very disappointing yields. In the trial of self-fertilized progeny of local selections, that of T38 (or material such as it is proposed to issue to farmers) was again amongst the first three in yield and was superior in size of bean.

Experiments on the rooting of cocoa cuttings were continued on a small scale. Cuttings were mainly taken from the tips of side-branches. The position of the cut, whether at a node or an internode and its straightness or obliqueness appeared to make little difference to the success of rooting. There was some indication that

watering of the cuttings with water slightly acidified with acetic acid assisted successful rooting, and this is being tried in a more critical test. Of 1963 cuttings taken from June to December, 917 or 47 per cent were rooted.

Three lots of budwood of South American types of cocoa were sent to Ibadan by the West African Cacao Research Institute from the Plant Quarantine Station at Accra, and were budded on seedling stocks. There was heavy loss in propagating but nevertheless plants belonging to forty-three types of cocoa were successfully raised and are to be planted out in the coming season for trial under local conditions.

3. *Ibadan Native Administration Cocoa Farm.*—The experimental plantings at Ibadan Native Administration Cocoa Farm resembled the bulk of the Nigerian cocoa crop this year in giving very low and erratic yields. As a result it was impossible to make any comparison of the behaviour of the Trinidad introductions and the local selections and their progeny, nor of the merits of the different planting distances in the spacing-trial. Though yields were low however the young plots made excellent vegetative growth during the year and both the progeny and the spacing trials should soon be fruiting sufficiently regularly to give serviceable results.

The balance of the 100 acres from the Reserve originally assigned by the Native Administration and Forest Department was demarcated, land selected by the Agricultural Chemists as most suitable for cocoa being chosen. Nearly seven acres was clear-felled and planted with banana shade for later planting with budded plants of T38.

4. *Agodi Cocoa Farm.*—The plots of farmers' cocoa now in the Agodi Reservation which are managed by the Department were maintained in good condition, but the yield of 379 lb of dry cocoa per acre was the lowest in seven years. The average yield for the previous six seasons was 631 lb per acre. The drop is attributed to low pod production following unfavourable weather and not to black-pod disease since the records show less than 5 per cent of the pods to have been attacked by *Phytophthora* rot (a much lower percentage than in the cocoa crop as a whole).

5. *Owena Cocoa Farm (Ondo).*—Damage on this farm from Capsid (chiefly *Sahlbergella singularis*) was extremely heavy and many trees were completely defoliated at the end of the year. Until an effective means of controlling capsids on cocoa trees of fruiting age is found, no useful results can be expected from these plots. The West African Cocoa Research Institute have plots at this farm where they observe the incidence of capsids, but not their control.

6. *Observation Plots.*—In co-operation with the Cocoa Survey about twenty cocoa farms in Ondo and Benin Provinces were chosen as observation plots. It is planned to obtain from these accurate records of yield of cocoa at different stages

of its life under a variety of conditions of soil and environment. In certain plots also, the effect of various cultural practices on yield and occurrence of capsid attack and *Phytophthora* (Black-pod) rot will be tried.

7. *Swollen Shoot*.—The collection of strains of virus from cocoa collected during the course of the Cocoa Survey was maintained in the insect-proof greenhouses. Although nearly all the known outbreaks of swollen-shoot disease occur within a relatively small area round Ibadan, nevertheless the manifestations of the disease are not identical in all these outbreaks. Small differences occur particularly in the leaf symptoms which, as they persist on plants inoculated under uniform conditions in the greenhouse, suggest the occurrence of strains of the virus. Six of these producing minor differences in leaf-symptoms have been collected but all produced swellings of the stems and twigs. Of a different nature is a virus found on cocoa trees at Asalu in Abeokuta Province. This produces a series of light markings on the leaf and following the primary and secondary veins on both sides. The markings are small, irregular in shape, and suggest at first sight the injury a gnawing insect might make. The leaf tends to be narrowed, as in the deficiency disease known as sickle-leaf, with secondary veins at an acute angle to the mid-rib and sometimes curved. The leaf-symptoms have been transmitted repeatedly by grafting. No swellings have been seen either in the field or on plants inoculated artificially. The disease is very local in occurrence and does not appear to be very destructive.

CITRUS

8. Unusually high yields of fruit were recorded in the rootstock trials of citrus at Moor Plantation which have now been fruiting for thirteen years. In the case of sweet orange budded on seven different rootstocks, the trees on sour orange stocks gave much the highest yield which is in accordance with previous results. In the trial with grapefruit as scion, tangerine, sour orange, and sweet orange stocks all gave high yields. In both trials trees with rough lemon stocks gave very low yields and are at this stage of their life in poor shape. The sudden death of several trees in the collection of imported varieties of citrus caused some concern in view of the fact that these trees were on sour orange stock which in other countries is reported as failing from disease. In these cases however death appeared to be associated with previous water-logging of the soil, and as sour orange was used as stock for most of this collection there is little cause to attach importance to the fact that they were trees on this rootstock which died.

CASSAVA

9. Work on this crop aims at finding varieties of cassava suited to the needs of the people which will give high yields in spite of mosaic disease. Experiments are being carried out in parallel at Ibadan and at Umuahia where effects of the disease appear exceptionally severe.

At Ibadan the collection of local and introduced cassava varieties was maintained, and yield trials of promising selections from it were continued. Of nine varieties

which were planted in April, 1946, and harvested a year later, the Gold Coast hybrid Garri (997B) retained the leading position gained in previous trials, and gave a significantly higher yield than the others. A further trial of nine varieties was laid down in April, 1947. A row of diseased cassava was planted round each plot to ensure exposure to infection by virus, and observations are being recorded not only on yield and appearance of mosaic symptoms but also on quality and palatability of the roots, matters which have received insufficient attention in previous tests of varieties.

An experiment was designed to find if a plot of a susceptible variety could be maintained free from mosaic disease in order to provide clean planting-material. The variety used was a local favourite known as Karagba, and sticks were taken from plants growing in a farmer's plot which were thought to be clean. These were planted in a plot at a distance from other cassava. Starting six weeks after planting, a weekly inspection of the plot was made and any plant showing infection was pulled out. In its place was planted a stick cut from a neighbouring plant showing no symptoms. Of the 1,620 original sticks, no less than 1,312 were pulled out in the first two inspections showing that most of the farmers' plants though showing no obvious symptoms nevertheless contained the virus. Thereafter the number of plants to be pulled out declined sharply and after five months, and until eleven months, no infected plants were found.

At Umuahia a collection was made including numerous varieties of cassava from farmers' plots in the Eastern Provinces and also some of the most promising varieties from the Ibadan collection. These were grown under observation so that the best might be picked for further trial. An attempt to grow clean material of a variety susceptible to mosaic proved more difficult than at Ibadan, since of the sticks taken from plants chosen as relatively free from virus over 90 per cent proved on sprouting to be carrying infection. No breeding of new varieties was attempted at either centre during the year, but some useful material for breeding was obtained from East Africa by kindness of Dr Nicholas, Plant Pathologist at the Amani Institute, in the shape of hybrids between cassava and *Manihot dichotoma* possessing immunity from natural infection under East African conditions.

COTTON

10. The routine selection and multiplication of Improved Ishan cotton was continued. A yield trial of seedlings from eight plants selected the previous year was made, but this plot and all the multiplication plots on Moor Plantation were so badly damaged by *Helopeltis* as to give a very poor yield. The failure of cotton on Moor Plantation in recent years has completely upset the scheme for multiplying this improved seed for farmers. A visit to Meko in December showed the cotton in the multiplication plots there to be making excellent growth, and to be free from attack by *Helopeltis*. It is proposed accordingly to transfer the first and second stages of multiplication from Ibadan and small trial plots are to be planted in several out-stations in the Western Provinces to find other and better places in which to perform the early multiplication.

TETRACARPIDIUM CONOPHORUM

11. In view of the interest aroused in this plant as a source of a quick-drying oil, notes were made on its occurrence and habits. The plant is not cultivated to any extent, but in many cocoa farms in the Western Provinces two or three specimens are to be found planted against tall shade-trees. Its description in the Flora as a climbing shrub ten to twenty feet high is misleading, since it is a typical liane climbing from the forest-floor to the tree-top and rambling over the branches for a considerable distance. Its cultivation as a crop would accordingly offer difficulty. While fruiting is normally from August to October there is evidence from Ondo of some plants which fruit also in April and May. Whether these plants are of a specially fecund race or are merely responding to especially favourable conditions has yet to be determined.

(b) ZARIA

12. The scope of the work is restricted by the fact that only one Botanist is available for the Northern Provinces, but the various lines of work particularly with annual crops have been continued. In the case of *cotton* the successful Samaru strain 26C has been maintained : it received favourable comment from the expert visitors from the Empire Cotton Growing Association. Strains of *ground-nuts* from selections and introductions made about 1948 were tested, that known as Kano 38 giving the highest yield. In a variety trial of upland strains of *rice*, Agbede was the highest yielder with 605 lb paddy per acre. Atchebu and Oshodi also did well, but Fortima seemed too slow maturing for the northern climate and Yar Bima failed entirely for this season.

13. *Sunflower* varieties have become mixed and single plant selections will have to be made. In a variety spacing trial, Saturn and Grey were the highest yielders with over 1,000 lb/acre each. Of local millets Zongo *ex* Kano and Wuyan Bajimi had the highest yield of 1,081 lb/acre. Sanyo Millet, introduced from Gambia, proved to be a long-term millet and not suitable for the Northern Provinces. Treatment of seed with copper carbonate continues to be the only satisfactory control for smut on *guineacorn*. Work on resistance to Striga has been started. Mass selection of seed from heavy heads continues. Attempts at vernalisation showed no response from either guinea-corn or millet.

14. A large trial of different methods of planting *cassava* is being carried out, following last year's finding that plant from fifteen inches cuttings yielded more than those from twelve inches, nine inches or six inches. There is also a cassava variety trial on clones from Ibadan and the Gold Coast, and seedlings have been raised locally and clones established for future trial.

15. In connection with *pasture* work, a proper herbarium has been started and about 100 specimens have been sent to Kew for identification. It is felt that little work on pasture can be done until it is possible to identify and name grasses with some degree of certainty. A living herbarium of perennial grasses is being maintained and enlarged. Single plant selections from the group of species included in the Hausa name Kyasuwa were tested in a trial.

16. Work continues on a large range of other crops of varying importance including cowpeas, tobacco, soya-beans, pigeon peas and others of lesser importance. Apart from botanical work, much time has been spent in collating experimental work done by other stations and in collecting a complete record of all experiments done in Northern Nigeria. These have been classified and indexed for ready reference.

Chemical Work

(a) IBADAN

VISIT TO FRENCH NIGER

17. In the early part of the year, the Senior Chemist and Dr Vine toured the drier parts of Northern Nigeria and French Niger Colony in company with Professor Aubert, Professor of Pedology in Paris, and Officer in charge of soil investigations in the French West African Colonies. The main objects of the journey were to study soil types common to both colonies and discuss methods of classification especially in relation to M. Aubert's work on soils in similar climatic zones in other French West African Colonies. The meeting was very instructive and satisfactory to both parties and valuable information on northern soil types was recorded.

THE GROUNDNUT SCHEME

18. From July to December the Agricultural Chemist was spending almost his full time on work in connection with this scheme. To begin with, he travelled—mostly by air—with the Groundnut Mission on their tour, and subsequently he organised a team to carry out a soil and plant survey of the areas selected by the Mission in Bornu and Niger Provinces. The team consisted of two Development Officers, a Surveyor and a Forestry Assistant, as well as junior chemical and clerical staff. At the same time, an officer of the Geological Survey investigated water supplies. In both Provinces adequate areas of the loose sandy soils most suitable for groundnuts were found, and recommendations were made as to the best points at which to start development. The Bornu area is rather hampered by the considerable depth from which water will have to be obtained: this difficulty does not arise in Niger Province, but the higher rainfall means that some care may be necessary in selecting groundnut varieties and planting dates. Experimental work on planting dates and on placement manuring has been planned to start forthwith in both places.

MOOR PLANTATION EXPERIMENTS

19. These experiments were continued as planned and reported upon last year, although the absence of the only Chemist while engaged on the extensive touring entailed by the groundnut scheme reduced supervision to a minimum. All results confirmed the previous observations that nitrogen was the chief deficiency on fields which had been in continuous cropping with green manures only over the past twenty years. The application of eight tons of farmyard manure or its mineral equivalent to early maize gave a large increase in yield, and the appearance of the crop clearly indicated that this was mainly due to nitrogen. Early maize receiving

no nitrogen did not respond to potash or phosphate. Although it was a good season for yams, plots receiving no nitrogen yielding 9,000 lb/acre, yet the application of 3 cwt/acre of sulphate of ammonia increased this yield by 63 cwt. This is a highly economic return with yams at 5s cwt and fertiliser at 7s 6d cwt. It has been noted in recent years on a certain field where a trial of the effect on early maize yields of burning a mucuna crop versus burying it green has been in progress for many years, that the crop on the burned plots showed signs of nitrogen starvation in the latter part of its growth. During the past year systematic studies of the nitrate nitrogen supply on this field have been undertaken. The first observations at the end of April showed thirty-two and sixty parts per million of nitrate nitrogen on burned and buried plots respectively. Both figures denote a reasonable supply. From that date the figure rose on the buried plots until the end of May when it reached ninety parts per million, the burned plots falling over the same period to twelve parts per million. In June and July when the crop is growing rapidly, and leaching is also appreciable, it was clear that the nitrifiable reserves on the burnt plots were exhausted, as their nitrate content approximated to one part per million over this period compared with a minimum of ten on the 16th July on the buried plots. There was some sign of recovery at the end of July—too late to be of any value to the maize—but later heavy rains reduced both sets of plots to very low values. Normal recovery on both commenced in December at the time of re-ridging.

FARM SITES

20. After several unsuccessful attempts, a suitable site was selected at Akure for a new experimental farm. The area includes a number of the inselbergs typical of the neighbourhood, and will present an interesting problem in lay-out when it has been completely surveyed. A site was also approved for a farm School at Ogbomosho. Soil profile pits were studied at sites near Abak, where it is hoped to acquire a substation for the Oil Palm Research Station and a Provincial Farm. The soils of the neighbourhood vary from infertile yellow brown sands to sticky loams of better quality. The sites include some intermediate types and some of the sandy soils.

(b) ZARIA

FERTILISERS

21. The posting of a Chemist to Samaru has permitted the resumption of the programme interrupted by the war. The range of manurial trials has been extended, and experiments have been carried out for the first time on three soil-types of the Upland Plateau. These trials have shown that the soils of the Plateau, in common with those of a large area of Northern Nigeria, are markedly deficient in phosphate and give good response to artificial fertilizers containing phosphate and additional nitrogen. On poor land at Gyel a phosphate-nitrogen mixture raised the yield of guinea-corn grain from 90 lb unmanured to 612 lb per acre, whilst on moderate land at Riyom the increase was from 771 lb unmanured to 1,243 lb per acre.

The economics of manuring with artificials have yet to be investigated for the Plateau. In Kano, Katsina and Zaria Provinces there is already weighty evidence that an application of superphosphate of the order of 50 lb per acre will give the peasant farmer good returns. During the year experiments have been made at a number of sites in these Provinces to help decide the optimum dosage and method of application with various crops. It has been found that superphosphate causes a very significant increase in the weights of cotton and guinea corn seedlings during the first three weeks of growth, thus showing the advantage of placing manures as close to the seed as possible. Groundnuts appear to respond to superphosphate at a later stage of growth, but very promising results have been obtained in Kano by applying 50 lb per acre with the seed. The extra yield of nuts due to manuring was 220 lb per acre on poor land with an unmanured yield of 155 per acre and 215 lb per acre on good land with an unmanured yield of 1,216 lb per acre. The present value of 220 lb nuts (£19 4s per ton) is 38s whilst the cost of 50 lb superphosphate landed Kano (£25 per ton) is 11s 2d.

Further economy in fertilizer utilisation can probably be effected by using fertilizers more concentrated than ordinary superphosphate, thereby reducing transport charges: for convenience of distribution and uniformity of application they are best issued in pellet form. Small-scale trials with groundnuts suggest that only slight modification of the toe and heel method of planting is needed to permit pellets of triple superphosphate or ammonium phosphate to be applied close to the seed without detriment to germination or early growth. Large-scale trials and demonstrations are planned for the coming year.

Bone-ash from the Kano abbatoirs, which has been in use for some time in stock rations, has during the year been given its first trial as a manure. It is expected to have a considerable residual effect, hence its value cannot be assessed on one year's crop. It has, however, given very good immediate results with groundnuts at Kano, an application of 100 lb per acre on poor land having given an increase in yield equivalent to that obtained from 50 lb superphosphate.

SOILS

22. A large number of soils have been examined in connection with experiments in progress in Plateau Province in the restoration of land on which tin mining has been carried out. Assistance has been given the Plateau Field Staff in planning trials in which top-soiling is compared with alternative procedures which include organic and artificial manures, and the use of various covers. At Samaru measurements of run-off and soil wash have been made on three soil types for the guidance of the Agricultural Engineer in planning anti-erosion measures. They have shown that at maximum rain intensity run-off from bare soils may reach 80 per cent. A grass cover reduces this figure by one-third during the early rains; its effect diminishes as the soils become more saturated in August and September.

PRODUCE

23. Analyses of condemned groundnuts have been made for the Produce Inspectorate, whilst periodic analyses are being made for the Pest Infestation Survey, pending arrival of their own analyst, to determine the rate of deterioration of groundnuts during storage. The usual field laboratory was established in Southern Zaria in January and February, when 258 pre-market and market samples of ginger were analysed. All market samples and all but two of the pre-market samples were found to conform to B.P. requirements.

Entomological Work

LOCUSTS

24. An *in situ* investigation into the origin of two small hopper bands of the Migratory locust reported from the Dikwa area of Bornu in November, 1946 showed that this locust is probably a normal inhabitant of the "fadamas" in this area. They are usually to be found in the solitary phase but under certain conditions they may form bands. The formation of these bands appears to be due to two factors, (i) the concentration of solitary individuals in the dry season in areas of green grass and (ii) the further concentration in the wet season on to islands by flooding. A closer study of the solitary population is necessary to elucidate further these factors.

As a result of this discovery it was decided that locust scouts should be employed throughout the year and that one scout should be assigned permanently to the larger fadamas.

It was found that the red locust had increased slightly in numbers but did not constitute any danger; they were more widely distributed than was expected.

In June, outbreaks of the migratory locust were reported from the middle Niger area. In view of this our anti-locust organisation was re-organised. Some of our stock of sodium arsenite has been replaced by "gammexane" and a further quantity is on order. Three main dumps have been established at Sokoto, Zaria and Maiduguri. A part of the Maiduguri stock was transferred to Adamawa after incipient hopper bands of the Migratory locust had appeared on the banks of the Benue, in November. These bands were identified as phase *transiens* by the Anti-locust Research Centre. As far as is known all the bands were destroyed by fire and beating.

CHRYSOPS RESEARCH, O.P.R.S.

25. The introduction at Benin of a sieving apparatus similar to that used in England for the estimation of Wire Worm populations allowed many *dipterous* larvae to be collected for breeding purposes. The apparatus is simple enough to be worked by a team of literate labourers thus leaving the assistants free to conduct other researches whilst being assured of a plentiful supply of material. From the collections it has been definitely established that the mud along the banks of the Okhuo river is the local breeding ground of *Chrysops dimidiata*.

The numbers of flies taken this year were considerably less than last year and were not sufficient for any marking experiments. As the following table shows the divergence in the incidence of the two species was not so well marked.

Species	May		June		July		Aug.		Sept.		Oct.		Nov.		Total	
	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947	1946	1947
<i>C. silacea</i> ..	9	—	53	—	133	13	75	30	24	20	24	5	3	14	268	82
<i>C. dimidiata</i>	0	—	0	—	0	9	0	16	19	34	265	19	83	22	367	106

The marked difference in numbers may perhaps be correlated with the high rainfall and the full-cloudy weather in 1947. Excess water in the swamps may have inhibited or delayed the emergence of adult flies and may also have had an adverse effect on the larvae. In an experiment on the effect of excess water it was observed that no adults emerged from larvae reared under such conditions.

Variations of temperature and/or humidity have been seen to affect the behaviour of Chrysops. Between 10 a.m. and 12 noon flies may be observed attacking workers in the open along the river side. From 2 p.m., however, the flies appear to be sheltering in the forests adjacent to the roads from where they attack the road makers.

Several control methods were tested including Kerosene, D.D.T. solution in kerosene, gammexane and drying out the mud; the latter was particularly successful. The others were satisfactory but were rather inconclusive and require further work.

PESTS OF STORED PRODUCTS

26. Experiments have been started to investigate the effect of spraying warehouses with D.D.T. in an attempt to control the tobacco beetle. Toxicity tests in the laboratory with a 5 per cent solution of a wettable D.D.T. powder (De De Tane) showed it to be an efficient insecticide. Tests carried out on a larger scale in cocoa warehouses in Ibadan were largely inconclusive owing to the continual movement of cocoa stocks. It would appear to be an excellent sanitary measure but for a direct control it will probably be necessary to devise a method of mixing minute quantities of insecticide with the cocoa. In this respect the following quantities have been approved by the toxicity Sub-committee of the inter-departmental standing conference on insecticides:—

D.D.T. 7 (Seven) parts per million.

Gammexane . . . 0.5 parts of the gamma isomer per million.

Experiments in applying oil were not very successful. The ordinary oil tends to become inactivated quickly by dust thus losing its stickiness. Heavier oils or even a light grease might be an improvement but it seems unlikely that the numbers of beetles trapped would reduce the population to any great extent.

Experiments at a local tobacco warehouse appeared to demonstrate the value of combining the D.D.T. spraying of walls with a routine spraying of pyrethrum in a light oil. This, however, is an expensive method outside the scope of an ordinary cocoa warehouse.

PESTS OF CHILLIES

27. Attempts have been made to study the life history and the incidence of *Oryzaephilus surinamensis* an occasional pest of chillies. Our findings suggest that infestation takes place in the stores before shipment. Nigerian ordinary capsicums from the Northern Provinces are reported as being free from attack when railed and although the markets in the south have been examined on many occasions no infestation has ever been found. In Lagos the beetle has been taken in warehouses and appears to be associated with bad storage conditions.

PESTS OF COTTON

28. *Helopeltis* was again a very serious pest at Ibadan. Largely as a result of its attack all the cotton in the four and five course rotations had to be uprooted. The only plot left was, significantly, the one being used for insecticidal trials, most of the plants in which had been heavily treated. Treatments consisted of dusts and sprays of both D.D.T. and Gammexane. The results have not yet been analysed statistically but it does not appear that any of the treatments are entirely satisfactory although in the earlier stages it was possible to distinguish by eye between the treated and untreated plots.

The incidence of Pink Bollworm attack in the Northern Provinces was studied throughout the season and, in the course of this work, it was found that the Red Bollworm, *Diparopsis castanea* was of considerably greater economic importance ; in certain areas, the latter species caused severe loss of crop. The occurrence of a diapause larva of the Pink Bollworm in the Northern Provinces was confirmed, a fact which is significant in relation to the suggested installation of Simon heaters at the cotton ginneries. The adult moths emerge in some numbers in November and December but by January most have entered the resting stage. In a typical experiment ninety-four adults emerged in December, nine in January and none in February. Preliminary experiments on the breaking down of diapause (resting stage) demonstrated that moisture had some effect but this appeared to be less marked as the length of time under diapause increased.

Oil Palm Research Station

BUILDINGS

29. 1947-48 was again a year of development and consolidation. Shortages of transport, materials and staff greatly delayed Public Works construction during the first six months, and although building was speeded up during the second half of the year, actual completed work fell far behind schedule. Thus only five Junior Staff houses were ready for occupation by the end of the year compared with the estimate of sixty-five Junior Staff and two Senior Staff quarters. The Station Manager's Office, one store, and the dispensary were also completed whilst buildings under construction include thirty-six Junior Staff and two Senior Staff quarters, the Administrative block and one laboratory. Departmental construction included fertilizer and general stores, garages, carpenters shop, hand press factory, and

Petrol and Record Stores. The installation of the temporary water supply was completed as far as the supply of distribution piping permitted. This has proved a great boon to the station providing as it does a supply of drinking water nearly two miles closer to the Labour Lines, and permitting for the first time regular and adequate watering of the nursery.

STAFF

30. The improved Senior Staff position permitted the resumption of regular supervision of the network of eighteen outstations and palm plots at which yield recording is carried out by Oil Palm Research Station staff. A start was made on the analyses of arrears of yield data, and from this further selections of high yielding palms were completed in order to increase the extension seed available to palm growers both in the main palm belt, and in the drier oil palm growing areas of the Western Provinces. It was not possible, however, for O.P.R.S. staff to undertake any new line of research, but one of the departmental Senior Botanists initiated a preliminary survey of oil palm disease throughout the main palm belt which, when completed, will indicate the precise pathological problems that require investigation by the Research Station.

The Junior Staff situation remained satisfactory, and routine work of the oil palm organisation, at the central station and outstations, was maintained with increased efficiency. In contrast to early pioneering years the labour supply was more than adequate for the construction programme and normal station requirements.

RAINFALL

31. The rainfall at O.P.R.S. during the wet season of 1947 was excellent from the point of view of the palms, and a really good planting season was obtained : monthly rainfall together with the eight year average, 1940 to 1947, was as follows :

1947			<i>Average</i> 1940-47
January	0.00 inches	0.46 inches	
February	2.11	0.84	
March	7.17	3.04	
April	5.16	6.47	
May	11.23	7.49	
June	8.03	10.68	
July	9.23	11.39	
August	15.55	7.25	
September	5.56	10.59	
October	11.12	8.49	
November	0.82	2.20	
December	0.60	0.23	
Total ..	76.58	69.09	

PLANTING PROGRAMME

32. Owing to the suspension of the breeding programme in 1945, planting in 1947 was on a restricted scale, the total areas planted amounting to 42.2 acres, made up as follows :

Block	Area	No. of Stands	Remarks
EC ..	15.6 acres	936	Miscellaneous selected dura material, to be used for future cultural experiments.
EN ..	8.9 acres	1,200	Progeny rows of <i>pisifera</i> crosses continuing earlier planting.
FP ..	12.4 acres	744	Routine yield trial of extension work seed.
RES ..	1.9 acres	114	Museum collection of miscellaneous palms.
EA (N)	3.4 acres	6,000	Transplanting Experiment IV.
Total ..	42.2 acres	8,994	

In all areas except the Transplanting Experiment, the seedlings were planted with a ball of earth, a rather difficult operation involving carrying of each seedling in a headpan, but with better availability of truck transport, planting operations were made somewhat easier. This, in combination with excellent late rains, has made for one of the more successful planting seasons at O.P.R.S., and by February, 1948, vacancies in these areas totalled only three palms dead and three doubtful. Another factor which has considerably aided the success of the 1947 planting was the arrival at the end of December, 1947, of part of a large Indent of wire netting, which was immediately cut up into collars and fixed round all young palms, as a protection against rodent attack. For the first time for many years, all young palms are now properly protected, and it is hoped that in future the station may not have to resort to costly and rather inadequate protection by means of wooden fences.

NURSERIES

33. In order to carry out experiments in connection with the "blast disease" which has caused heavy losses of young palms in the nursery stage, approximately 20,000 miscellaneous seedlings were planted in blocks EM and EA, and a very comprehensive series of nursery experiments covering a range of cultural treatments, such as watering, shading, roguing of diseased seedlings and application of manure, were laid down, using these seedlings. Throughout the main nursery and all these experiments monthly disease counts have been taken. With the installation of the temporary water supply, including a 3,000 gallon tank at the nursery site, regular watering of the seedlings in the main 1947 nursery has been possible, and on the average, each seedling has received three gallons per month. As a result of this, the seedlings have grown slowly during the dry season and have kept in a very healthy state, with losses from blast disease at a low level, 12 per cent in mid February in the main nursery.

With the cessation of the breeding programme in 1945, and a probable smaller planting programme in 1948, the nurseries in 1947 were rather smaller than in previous years : approximate numbers of seedlings planted in the main nursery were as follows :

Extension Work Seed	5,200	For extension work seed trial to be planted in 1948.
Cultural (Selfed <i>duras</i>)	3,700	For cultural experiments.
Selfed CA 256 (dura Selection) ..	2,200	For standard in yield trials, etc.
Miscellaneous	600	For Museum collection.
Total	11,700	

GERMINATION PROGRAMME, 1947

34. A full germination programme was started as usual in July, 1947, the following being the approximate numbers of seeds sown then :

	<i>Seeds</i>
Selfed CA 256	4,500
Cultural (Selfed <i>duras</i>)	11,400
Extension Work Seed	19,700
Miscellaneous	91,500
Germination Experiments ..	23,000
Total	150,100

Germination after six months was about 35 per cent, which is not satisfactory, but it is hoped to build new germinators in time for the 1948 programme.

CULTURAL EXPERIMENTS AT O.P.R.S.

35. The Establishment Experiment and Burning versus non-burning Experiment, planted in 1940, reached their second year of bearing and yield recording in 1947, and with sufficiency of labour, were maintained in good condition. The Spacing, Grazing and Intercropping Experiment, planted in 1945, made good growth—two or three of the larger palms in the experiment actually produced small flowers in 1947—and the stand is now complete. The Soil Covers Experiment, to test the effect of various covers on the soil, continued through 1947, and felling took place late in the year, with a view to extending the experiment in 1948.

IMPROVED SEED FOR FARMERS

36. Improved seed for farmers (extension work seed) was produced at the usual three centres, Ogba, Nkwele and Umudike, from trees selected for yield and fruit composition, and was of the three types :

Dura x Dura
Dura x Tenera (at Ogba, *Tenera x dura*)
Dura x Pisifera

A major advance during the year was the completion of the revision of selection of all trees at Ogba, which has resulted in an increase in the number of selected trees from 158 (from 19 acres of palms) to 322 (from 39 acres). This will result in a large increase in the amount of selected seed produced, and to increase the numbers further, all seed trees have been manured to increase their yield, and the cross *dura* x *tenera* has been replaced by *tenera* x *dura*, so as to use the ninety-seven selected *tenera* trees as seed trees instead of, as previously, merely pollen producing trees.

A similar selection of seed trees in one block of palms at Ibadan has also been undertaken, and sixty-seven selected, so that in 1948 it will be possible to commence artificial pollination there, to produce extension work seed, mainly intended for farmers in drier areas.

Total production of seed in 1947 was as follows :—

	Ogba	Nkwele	Umuahia	Total
<i>Dura</i> x <i>Dura</i> ..	89,219	28,266	37,454	154,939
<i>Dura</i> x <i>tenera</i>	91,182	18,789	28,144	138,115
<i>Dura</i> x <i>Pisifera</i>	84,068	23,415	19,949	127,432
Total ..	264,469	70,470	85,547	420,486

O.P.R.S. SUB-STATION

37. Towards the end of 1947, a start was made with the labelling of the wild palms in the palm groves on a piece of land at Abak, which when negotiations for its acquisition are completed, will form part of the O.P.R.S. Sub-station. By the end of the year all the palms, totalling over 7,000 had been labelled, and yield recording commenced.

OUTSTATIONS AND FARMERS' PLOTS

38. No new areas were acquired in the year under review, though the provincial Agricultural Staff in Calabar Province commenced an examination of farmers' oil palm plots with a view to selecting suitable ones for recording by O.P.R.S.

Yields for 1947 at Farmers' Plots were as follows :—

Province	Plot		Plot yield, 1947		Approximate yield per acre, 1947	
			No. of Bunches	Weight of Bunches, lb	No. of Bunches	Weight of Bunches, lb
BENIN	Ehor	BP	2,918	86,062	162	4,781
ONITSHA	Nsugbe	NS	3,633	48,061½	259	3,433
	Awka	NA	1,839	38,914	167	3,537
	Ajalli	NJ	647	15,765	162	3,941
	Achi	NH	4,373	27,406½	218	1,320
	Adani	NN	5,366	91,787½	278	4,755
OWERRI	Mbawsi	UB	7,941	132,095½	240	4,005
	Imo River	UM	1,913	66,545	159	5,567
	Akwete	UA	1,467	26,230½	122	2,186

For comparison, yields are given below for representative areas on Oil Palm Research Station.

<i>Block</i>	<i>Total yield, 1947</i>		<i>Approximate yield per acre</i>	
	<i>No. of Bunches</i>	<i>Weight of Bunches, lb</i>	<i>No. of Bunches</i>	<i>Weight of Bunches, lb</i>
ET (Palm Grove)	2,290	67,838	229	6,784
EA 1939 planting	7,266	136,165	356	6,675
EB 1939 „	7,155	148,713	389	8,082
EA 1940 „	8,208	99,995	510	6,211
EB 1940 „	13,037	186,176	524	7,477
EA 1941 „	6,472	76,608	647	7,661
EB 1941 „	4,097	49,407	253	3,050

TRANSPLANTING EXPERIMENT

39. Results of the 1947 experiment are still incomplete. Indications are that standard planting practice with a ball of earth, combined with no pruning, will prove best. Thirteen different treatments including leaf pruning and various root and planting techniques were tried with three planting dates, June, July and August. In spite of exceptionally late rains June was the only really successful planting month.

K. T. HARTLEY,

Acting Assistant Director, Research

V. Agricultural Schools

Ibadan

STAFF

The technical staff of the School consisted of two members of the Senior Service with degree qualifications and nine members of the Junior Service, of whom five possessed the Nigeria (Yaba) Diploma in Agriculture or Science and among whom are four with the Intermediate Degree qualification in Science, Economics, or Commerce. In addition lecture courses were given by specialist officers of the Department.

Two former members of the School staff proceeded to the United Kingdom, one for Honours Botany Degree training at London University and the other for a two-years' course in Poultry Husbandry at the Monmouthshire Institute of Agriculture.

STUDENTS

2. Of the eighty-one students in residence in 1947, thirty-seven Nigerians completed their training during the year. Of these, four qualified for the award of Diploma in Agriculture, being appointed Assistant Agricultural Officers, and twenty-eight qualified as Agricultural Assistants. In addition six members of the Gold Coast Agricultural Department completed a two-year course of training with the Nigerian Diploma students and subsequently returned to the Gold Coast.

COURSES

3. (a) Diploma and Supplementary Assistant Agricultural Officer Training. These courses now include individual responsibility for a local problem in agricultural research.

With the establishment of the University College at Ibadan opportunities for advanced training at degree standards naturally proved more attractive to suitably qualified men than training at the previous Yaba Diploma level. In order to train suitable men for appointment at the Assistant Agricultural Officer grade, a Supplementary Assistant Agricultural Officer three-year training scheme based on Diploma standards was introduced, the classes being recruited partly from commended Assistants in the Department but mainly from outstanding men in first-year Assistants' training classes at the Schools at Samaru and Ibadan.

(b) Agricultural Assistants Courses. These now consist of two consecutive years of training at the School.

FARMS AND BUILDINGS

4. Progress was made during the year with the expansion of the School Farm to consist ultimately of forty acres in addition to the existing School plots. This will permit of students being responsible for their own stock and major farm operations.

Improved housing for sixty students and two instructors approached completion under the supervision of School Staff ; housing of the School technical staff remained unsatisfactory.

Samaru, Zaria

STAFF

5. A Senior Service officer was in charge of the school throughout the year, but there was a serious shortage of Junior Staff in the latter part of the year, and courses had consequently to be modified.

STUDENTS

6. Only Agricultural Assistants are trained at Samaru. At the beginning of the year there were forty-six in residence. Of these five were transferred to the Supplementary Diploma class at Ibadan and eight either resigned or failed to qualify for the second year of the course. Six were available for posting at the end of the year. Of the thirty-three left, only eight were of Northern extraction.

A record class of thirty-one has been recruited for training in 1948 and includes twelve of Northern extraction. Eleven of the latter have only Class IV Middle whereas the normal entry level is Class VI Middle, but they have had at least two years of outstanding field service to their credit ; five of them are financed by Native Administrations. Necessary alterations and additional temporary buildings to accommodate the larger class have been put in hand. The Public Works Department started work on the new permanent School buildings in November, 1947.

D. W. H. BAKER,
Principal

VI. Produce Inspection: 1st April, 1947-31st March, 1948

STAFF

1. One Senior Agricultural Officer and two Agricultural Officers were seconded to the Produce Inspection section. Six Development Officers were made available for service as Produce Officers. Two Senior Service Officers were promoted to posts of greater responsibility, and one Junior Service Officer was promoted to the Senior Service.

PRODUCE INSPECTION STATIONS

2. The following gazetted Inspection Stations and Markets were newly opened during the year :—

(i) Under Palm Oils, Palm Kernels, Cocoa and Cassava Starch (Inspection for Export) Regulations.

Umuchima Pioneer Oil Mill (E.P.)

Ahoda Pioneer Oil Mill (E.P.)

Azumini Pioneer Oil Mill (E.P.)

Ago Owu (W.P.)

Araromi Ago Owu (W.P.)

(ii) Under the Cotton Marketing Export Regulations :—

Gombe Bagana

Loko Kurfi

Unaisha Gudi

Weto Kauru

(iii) Under the Groundnuts (Inspection for Export) Regulations :—

Anka Dan Musa

Bakori Kankara

Jos Karadua

Mai Inchi Awai

(iv) Under the Capsicum (Inspection for Export) Regulations :—

Ago Are (W.P.)

RE-ORGANISATION

3. A Senior Produce Officer was posted to Akure in October, 1947 and took over control of the Warri/Benin, Uromi and Ondo Areas from the Senior Produce Officer (Western Provinces), Ibadan, as it was agreed that the volume of produce was too great and Area covered too vast to be under the control of one Senior Produce Officer. The headquarters of Ondo/Akure Area was transferred from Akure to Ondo.

COCOA

4. The practice of prohibiting purchase of Light Cocoa in the main Cocoa Season and *vice versa* was discontinued in 1947-48 and purchase of both Main and Light Cocoa was permitted throughout the year.

(i) *Light Cocoa*.—Gradings of Light Cocoa decreased by 2,110 tons compared with the previous year, the comparative figures being :—

1946-47	1947-48
8,209 tons	6,099 tons

The decreased production was due to the drought in 1946 and the beans were much smaller in size than in previous years, weights as low as $6\frac{1}{2}$ oz per 300 beans being recorded. The comparative percentages of each grade for the two past years were as follows :—

	Grade I	Grade II	Grade III
1946-47	5.5	89.1	5.4
1947-48	11.1	88.9	—

Grade III was not purchased for export during 1947-48 Light Crop Season.

(ii) *Main Cocoa* : The practice in previous years of confining the purchase of Main Cocoa to a definite Season and prohibiting the purchase during the remainder of the year was discontinued. The Season opened on the 3rd October, 1947, but purchase of Main Cocoa was permitted after the Normal Main Season was over. During 1947-48 a total of 69,435 tons of Main Cocoa was graded, this figure fell short of the previous year by 33,250 tons.

A few months before the 1947-48 Season, the Crop promised to be an all time record, but the exceptionally heavy and late rains not only damaged the blossom but caused widespread damage by black-pod disease, resulting in the crop being the smallest recorded for many years. The incidence of black-pod disease was greatest in Ondo Area where the crop showed a decrease of 41.1 per cent on the previous year. During the early part of the year a most intensive propaganda campaign was undertaken with a view to improving the quality of cocoa and ensuring its cleanliness and freedom from black and velvety beans. All sections of Government and all Native Authorities assisted in this campaign and the results were extremely satisfactory, exceeding even the most optimistic expectations.

The increased differentials between grades paid in the 1947-48 Season gave the necessary incentive for better fermentation of the cocoa and it was the combination of this and the campaign to improve quality which resulted in the very much higher standard of quality than has ever before been achieved in Nigerian Cocoa. In this connection it is worthy of note that in the Warri-Benin Area where fermentation has always been good, but the propaganda drive was of necessity less intense, despite the increased price margin between grades, the percentage of Grade I actually decreased from 76 per cent in 1946-47 to 62 per cent in 1947-48,

Owing to the new grades introduced in 1947-48, a comparison with the grading figures of previous years would be worthless, but the following figures give the percentage of the 1946-47 Crop falling within the existing grades compared with the 1947-48 Crop :—

<i>Grade</i>	<i>1946-47 Crop falling within existing grades</i>	<i>1947-48 Crop Graded</i>
I	22.63%	45.14%
II	1.62%	19.09%
III	18.19%	24.83%
IV	55.15%	10.88%

The new Grades introduced in 1947-48 permitted up to less than 10 per cent defective beans in Grades II, III and IV compared with less than 8 per cent in the previous Grade II, but under the new grades germinated beans were classed as defective in all grades instead of in Grade I only as was formerly the case.

The Lagos ex-scale prices per ton paid for Main Cocoa during 1947-48 were as follows :—

<i>Grade I</i>	<i>Grade II</i>	<i>Grade III</i>	<i>Grade IV</i>
£61 15s 0d	£59 5s 0d	£56 5s 0d	£46 15s 0d

These prices were a considerable increase on recent years as can be seen by comparison with the average Grade II prices for the past six years :—

	£	s	d
1941-42—	14	10	0
1942-43—	12	2	6
1943-44—	12	1	0
1944-45—	21	10	0
1945-46—	25	11	0
1946-47—	47	1	0

Evacuation of cocoa was very satisfactory and storage deterioration negligible. Evacuation of Ondo District via Agbabu or Okitipupa again presented certain difficulties, but the hold-up was not on the same large scale as in the previous year and there was no serious infestation by tobacco-beetle (*Lasioderma Serricorne*) which accounted for 457 tons having to be destroyed in 1946-47.

GROUNDNUTS

5. The price paid for Kano groundnuts remained at £16 per ton as in 1946-47.

The Crop was a most satisfactory one, the purchases for the past three years as reported were :—

		1945-46	1946-47	1947-48
		<i>tons</i>	<i>tons</i>	<i>tons</i>
Kano Area	..	286,817	304,609	315,020
Rivers Area	..	14,882	18,090	14,589
Total	..	301,699	322,699	329,609

The position regarding French Groundnuts, which are not inspected, at the end of March, 1948, was that 3,955 tons had been railed and 21,441 tons on hand.

Quality tests again showed an increase in the shell content although the average was well within the prescribed limits. It is reported that the producer is paying less attention to cleaning his produce knowing that it will be accepted so long as it is within the limits of permissible impurities which remained as in the previous year, not more than 0.2 per cent stone, etc., and 1.5 per cent total impurities. Comparative figures of average impurities are as under :—

	1945-46	1946-47	1947-48
Percentage of Stones	0.041	0.099	0.078
Percentage of other impurities ..	0.194	0.270	0.351
Percentage of total impurities ..	0.235	0.369	0.429

The problem of storage was greatly aggravated by the large tonnage purchased and the large overlap from the previous season due to the impossibility of evacuation by rail being able to keep pace with purchases. At the end of March, 1948, there still remained over 23,000 tons of the 1946-47 crop not evacuated to port. Stocks in the Northern Provinces were far greater than available storage space and all surplus stocks had to be stored in pyramids in the open. At the end of the year there were 313 pyramids containing an average of 8,000 bags each. Owing to the care exercised in protecting these pyramids from damage by rain, white ants, etc., deterioration beyond Export quality was kept down to 0.1 per cent of the 1946-47 Crop.

COTTON

6. (i) *Northern Provinces*.—Markets opened from the 17th November, 1947, in Northern Katsina, 15th December, 1947, in the Main Cotton belt, and 5th January, 1948, in the development area of Niger Province, and closed at dates between the 22nd January, 1948 (Kurfi) and 8th April, 1948 (Development area).

The main feature of control and supervision of cotton markets was the transfer of responsibility for sealing from Produce Examiners to Native Administration Cotton Examiners. The Produce Examiners remained responsible for Market Records, discipline in the buying section, Cotton check-testing and general administration only.

Pink Bollworm infestation was again widespread, but it is not yet possible to assess the amount of damage done to the lint. Losses to farmers were not so great as in the previous year.

The Produce Officer, Kano was again gazetted as Licencing Authority, and Buying Agents as in the previous year limited their activities to fewer markets and fewer stalls. 178 licences were issued against 174 in the previous year.

The number of markets in which each buying Agent operated, compared with 1946-47 is shown below :—

<i>Firm</i>		<i>Markets operated 1946-47</i>	<i>Markets operated 1947-48</i>
B. C. G. A.	..	—	1
U. A. C.	..	33	31
L. & K.	..	14	15
J. Holt	..	21	18
C. F. A. O.	..	10	12
P. S. M.	..	2	4
C. Zard	..	—	—
G. B. O.	..	20	22
S. C. O. A.	..	14	15
P. Z.	..	10	10
Total		124	128

The distribution of licences and stalls in the Cotton producing provinces were as follows :—

<i>Province</i>			<i>Number of Licences</i>	<i>S t a l l s</i>		<i>Grade Total</i>
				<i>Grade I</i>	<i>Grade II</i>	
Sokoto	..	..	44	33	13	46
Katsina	..	..	91	64	18	82
Zaria	..	..	41	29	18	47
Plateau	..	..	2	2	2	4
Bauchi	Development					
Area	..	..	—	—	—	—
Niger	..	..	—	—	—	—
			178	128	51	179

Revenue collected was as follows :—

		1946-47	1947-48
		£ s	£ s
Market Area Licencing Fees		8 14	8 18
Scale fees		277 10	281 10
		£286 4	£290 8

The price for Grade I was increased from 2.7d in 1946-47 to 2.8d in 1947-48 and Grade II reduced from 2.6d to 2.5d per lb at ginnery. On the 14th February, 1948, both grades were raised in price by $\frac{1}{2}$ d per lb, so during the latter part of the season 3.3d per lb for Grade I and 3d per lb for Grade II were the ginnery prices.

The quality was generally good with comparatively little stain.

The ginning percentages supplied by the Manager, B. C. G. A. being as follows :—

<i>Ginnery Area</i>	<i>Seed Cotton lb</i>	<i>Ginnery Percentages</i>	<i>Bales lint Calculated at 400 lb each</i>
Zaria	5,102,556	34.62	4,416
Funtua	12,041,228	33.02	9,941
Mallam Fashi	1,015,502	31.23	793
Gusau	2,629,843	30.74	2,021
Mai Inchi	831,630	31.36	673
Kontagora	716,373	33.39	598
	22,337,132	—	18,442

The following figures give the percentages of Grades I and II compared with the two previous years :—

<i>Province</i>	<i>Grade I</i>			<i>Grade II</i>		
	1945-46	1946-47	1947-48	1945-46	1946-47	1947-48
Zaria	97.5	93.8	97.9	2.5	6.2	2.1
Katsina	94.6	91.5	95.7	5.4	8.5	4.3
Sokoto	94.7	92.9	96.2	5.3	7.1	3.8
Bauchi	97.5	92.9	89.2	2.5	7.1	10.8
Plateau	97.1	97.2	95.9	2.9	2.8	4.1
Niger	91.1	80.8	85.8	8.9	19.2	14.2
Average	95.4	91.5	93.5	4.6	8.5	6.5

Purchases were considerably less than last year not on account of the crop being smaller but owing to a greater demand for local consumption, especially Grade II, and a large proportion of the crop being exported to French territory as a result of well organised buying for this local Market by African Traders.

The comparative Seed Cotton grading figures for the past two years were as follows :—

Province	Grade I		Grade II		Total	
	1946-47	1947-48	1946-47	1947-48	1946-47	1947-48
Katsina	19,765,369	13,190,453	1,830,622	634,531	21,595,991	13,824,984
Zaria	6,980,247	3,934,342	457,995	85,170	7,438,242	4,019,512
Sokoto	8,319,862	3,313,941	636,319	132,191	8,956,181	3,446,132
Bauchi	85,617	14,014	6,554	1,697	92,171	15,711
Plateau	74,482	66,196	2,174	2,838	76,656	69,034
Niger	1,198,990	614,456	265,386	101,272	1,384,376	715,728
Totals	36,344,567	21,133,402	3,199,050	957,699	39,543,617	22,091,001

OR

Month	Grade I		Grade II		Totals	
	1946-47	1947-48	1946-47	1947-48	1946-47	1947-48
November	115,563	653	61,574	160	177,137	813
December	1,336,990	2,287,956	366,078	163,296	1,673,068	2,451,252
January	16,888,156	12,127,706	1,460,048	531,452	18,348,204	12,659,158
February	16,103,377	6,404,503	1,167,546	254,141	17,270,923	6,658,644
March	1,900,481	312,584	173,804	8,650	2,074,285	321,234
Totals	36,344,567	21,133,402	3,199,050	957,699	39,543,617	22,091,101

Decrease .. —15,211,165 —2,241,351 —17,452,516
—41.5% —70.1% —44.1%

(ii) *Southern Provinces*.—Cotton grading in the Southern Provinces was confined to Abeokuta Province, only approximately 23 tons being graded, most of which was graded at Meko.

Owing to demand for the local weaving industry, the export of cotton from the Southern Provinces has virtually ceased.

Comparative gradings in lbs for the last three years were as follows :—

Year	IN I	IN II	IN III	N.N.	Total
1945 ..	239,685	2,609,673	102,475	347,497	3,299,330
1946 ..	123,212	2,754,677	475,197	7,404	3,360,490
1947 ..	35,198	7,670	8,513	—	51,381

The percentages of each grade compared with the previous year were as follows :—

<i>Grade</i>				1946	1947
				per cent	per cent
IN	I	..	..	3.7	68.5
IN	II	..	..	81.9	15.0
IN	III	..	..	14.2	16.5
NN	..	..	..	0.2	—

The prices paid per cwt. compare with 1946 were as follows :—

<i>Grade</i>				1946	1947
				£ s d	£ s d
IN	I	..	..	1 0 7½	1 8 0
IN	II	..	..	0 18 3½	1 5 8
IN	III	..	..	0 15 11½	1 3 4
NN	..	..	..	0 10 6	0 14 0

PALM KERNELS

7. The tonnage inspected for export showed an increase of 13,592 tons on the previous year. The tonnage passed for the last three years being as follows :—

1945-46	1946-47	1947-48
283,471	311,772	325,364

In the Western Provinces there was a decrease of 4,611 tons, Warri, Ondo and Uromi Areas all showed increases so the decrease was confined to the Western Sector of the Western Provinces probably due to the production of cocoa and food crops being more profitable than Palm Kernels and the consequent diversion of work from Palm Kernels to other crops.

The reason for the increased production in the Eastern Provinces is reported as being due to the higher prices paid for Palm Kernels coupled with the improved supply of consumer goods.

A satisfactory quality was maintained throughout the year, but difficulty was experienced in drying Kernels during the heavy rains of 1947, at Umuahia. The nuts in this district are cracked rather sooner after the oil has been expressed from the fibre than in other parts, the result being that the Kernel is less mature and many are broken in the cracking process. These broken Kernels tend to decay in storage and as a result of long storage some 4,000 odd bags had to be shipped under special licence.

£16 5s 3d per ton was paid for palm kernels ex-scale Lagos until March, 1948, when it increased to £20 6s 6d per ton.

PALM OIL

8. The tonnage of palm oil passed for Export showed an increase of 23,043 tons on the previous year, the gradings for the past three years being as follows :—

1945-46	1946-47	1947-48
110,230	130,357	153,400

The Eastern Provinces were principally responsible for the increased tonnage accounting for 20,783 tons of the total increase of 23,043 tons. Slight increases were also recorded in Warri, Ondo and Uromi Areas, but any hope of the increase in price resulting in a revival of trade in Lagos and the Western Sector did not materialise, six tons only being graded at Epe and fifty-two tons in Lagos, all purchased before July, 1947.

More attractive prices encouraged production and accounted for the increase in tonnage graded.

A fair quality was maintained so far as freedom from impurities was concerned for which tests were made by this Department. The grading of the oil according to F.F.A contents was again done by firms, their results being checked periodically by this Department.

The following table shows the tonnage of each grade for 1947-48 together with the percentage of each grade compared with the previous year :—

		Grade I	Grade II	Grade III	Grade IV	Grade V
Tonnage	1947-48	98,729	22,065	20,768	10,525	1,313
Percentage	1947-48	64.3%	14.4%	13.5%	6.9%	0.9%
Percentage	1946-47	61.7%	15.1%	13.8%	8.1%	1.3%

The prices paid for Palm Oil (Lagos Basis) were as under :—

Grade				FFA Content per cent	Price April-Dec. 1947			Price Jan.-Mar. 1948		
					£ s d			£ s d		
					£	s	d	£	s	d
I	..	..	..	0-9	25	6	6	32	0	6
II	over	..	..	9-18	23	1	6	29	15	6
III	over	..	..	18-27	21	11	6	28	5	6
IV	over	..	..	27-36	20	9	0	27	3	0
V	over	..	..	36	19	6	10	26	0	6

POTATOES

9. Potato grading continued at Jos, Hoss, Zaria, Guga and Shemi, Jos being the main centre and 75 per cent of the total tonnage for the year was graded on the Plateau.

Prices ranged from 3d to 7d per lb the bulk of the crop being sold at 4½d to 5d per lb.

The quality remained very satisfactory, but production fell by 284 tons, principally due to shortage of seed potatoes and consequently there was smaller acreage planted.

For the first time since early in the war local supplies were augmented by imports from South Africa which were retailed in Lagos at a lower price than those produced on the Plateau.

The following table gives the monthly tonnage graded during the past three years :—

<i>Month</i>	1945-46	1946-47	1947-48
April	111	98	43
May	50	55	31
June	31	53	41
July	16	128	61
August	100	128	51
September	78	105	84
October	90	108	54
November	58	64	53
December	117	56	53
January	64	31	41
February	58	30	51
March	86	45	54
	859	901	617

CHILLIES AND CAPSICUMS

10. (i) *Nigerian Birdseye Chillies*.—The season opened on 3.11.47 and sixty-six tons of Grade II and thirty-three tons of Grade III were passed for export. None was graded in the previous year the quality being too poor owing to discoloration as a result of the inclement weather.

Messrs John Holt and Company Limited purchased the whole crop which was produced mainly by Co-operative Societies.

The climatic conditions are not favourable for production of Grade I chillies and insect infestation of this crop is very rapid if stored for any length of time, some parcels had to be down-graded as a result and shipped under special licence. Buyers are rather wary of this crop owing to the rapidity of deterioration in quality and the growing difficulty of disposal in the world markets.

(ii) *Ordinary Nigerian Capsicums*.—There was no grading for export throughout the year. This complete collapse is a direct repercussion of the severe financial losses suffered by most Exporters last year. Every effort was made to encourage firms to purchase, but without avail. Fortunately the local trade was able to consume practically the whole crop.

GINGER

11. Markets are operated at Kachia and Zonkwa only as follows :—

<i>Market</i>	<i>Date Gazetted to open</i>	<i>Date actually operated</i>
Kachia ..	26th to 31st January	26th to 29th January.
Zonkwa ..	4th to 7th February	4th and 5th February.
Kachia ..	1st to 5th March	1st March only.

Purchasing firms were Messrs G. B. Ollivant Limited, and S. C. O. A., Messrs Raleigh and Sons obtained a licence but did not operate. Only yellow ginger was marketed.

Comparative figures for the past three years of purchases and prices are as below :—

<i>Year</i>	<i>Grade</i>	<i>Price</i>	<i>Zonkwa cwts.</i>	<i>Kachia cwts.</i>	<i>Total cwts.</i>	<i>Percentage</i>
1946	I	6d	485	16	501	76
	II	4d	151	5	156	24
Total	—	—	636	21	657	—
1947	I	6d-5½d	1,711	57	1,748	83
	II	6d	325	33	358	17
Total	—	—	2,036	90	2,106	—
1948	I	6d-5½d	1,638	100	1,738	77
	II	5d-4½d	439	70	509	23
Total	—	—	2,077	170	2,247	—

Quality was satisfactory, the Kachia crop being somewhat superior to that of Zonkwa.

<i>Revenue collected</i>		1946-47			1947-48		
		£	s	d	£	s	d
Staff Fees	..	50	0	0	56	0	0
Licences	..	0	15	0	0	13	0
Total		£50	15	0	56	13	0

RUBBER

12. 4,093 tons of plantation rubber were graded in 1947-48 compared with 5,270 tons in the previous year, a decrease of 1,177 tons. Warri/Benin Area, the main producing district showed a decrease of 955 tons. Prices have been rather unstable and varied in different districts, but during the latter part of the year under review the price ranged from 5½d to 8½d per lb and was thus nearly double that of the early months of 1947 when the new grades, based on R.M.A. grading were introduced.

Production has naturally decreased since the days of high prices paid during war years, but has shown improvement since December, 1947 and there are signs that improved production will be maintained if the present price remains stable.

The Comptroller of Customs supplied the following figures for exports (to nearest ton) :—

<i>Month</i>	1946-47	1947-48
April	1,304	594
May	371	282
June	380	535
July	720	589
August	414	736
September	1,312	1,217
October	1,284	181
November	859	756
December	1,357	351
January	1,098	915
February	370	714
March	736	886
	10,205	7,756

BRITISH CAMEROONS

13. The following table gives particulars of tonnages inspected and graded in the British Cameroons since 1939-40 :—

<i>Year</i>	<i>Palm Kernels</i>	<i>Palm Oil</i>	<i>Cocoa</i>
1939-40	1,545	1,841	3,535
1940-41	611	741	1,483
1941-42	1,419	4,008	2,262
1942-43	1,942	4,806	1,638
1943-44	2,434	4,861	1,897
1944-45	2,405	5,016	1,685
1945-46	2,616	4,232	2,071
1946-47	878	1,197	1,637
1947-48	861	1,328	2,299

PROSECUTIONS

14. The following details give particulars of the prosecutions undertaken during the year 1947-48 :—

<i>Areas</i>	<i>No. of Cases</i>	<i>Convictions</i>	<i>Acquittals</i>	<i>Cases pending</i>	<i>Withdrawn</i>	<i>Forfeitures</i>	<i>Absconded</i>	<i>Fines</i>		
								s	d	
Northern ..	27	22	1	4	—	—	—	14	14	0
Central ..	51	45	2	3	1	—	—	133	9	8
Lagos ..	35	35	—	—	—	—	—	223	5	0
Western ..	180	168	1	3	—	2	6	700	10	7
Eastern ..	282	268	14	—	—	—	—	437	7	10
Totals ..	575	538	18	10	1	2	6	1,509	7	1

N. W. HARDWICK,
for Acting Assistant Director of Agriculture
(Produce Inspection)



GP LAGOS
357/449/660